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EDUCATIONAL POLICY ANALYSIS AND STRATEGIC RESEARCH

TABLE OF CONTENTS

Volume 17, Number 3
June 2022

Articles

Educational Policy Analysis and Strategic Research, V17, N3, 2022

The Relationship Between Academic Risk-Taking Behaviours and Writing Concerns of Middle School Students

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Abstract

In this study, it was aimed to examine the relationship between middle school students' academic risk-taking behaviours and writing anxiety. This relational survey type research was carried out in the 2020-2021 academic year. The sample of the study consists of 493 middle school students in a city in Turkey. The data of the study were obtained from the "Academic Risk-Taking Scale" and the "Writing Anxiety Scale". Correlation Analysis tests were used in the analysis of the data. As a result of the research, it was found that there is a moderately significant negative correlation between the academic risk-taking behaviours of middle school students and their writing anxiety. While there was no significant difference in the academic risk-taking behaviours of the students in terms of school type, grade level, number of pages in reading books and academic achievement scores in the mother tongue course, a significant difference was found in terms of the variables determined in writing anxiety.

Keywords: Academic risk-taking, writing anxiety, middle school students.

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Introduction

In the contemporary education approach, it is aimed to develop some knowledge, skills, and competencies in individuals. This accepted approach will both guide individuals to have the necessary competencies in the construction of the society they live in and help them learn the conditions of the age they live in, in other words, to understand and make sense of the life they live in. In the learning-teaching process, one of the concepts related to humans as well as the cognitive domain is the affective field characteristics. This concept is related to the value that the individual adds to the cognitive learning process (Varışoğlu & Ekinci Çelikpazu, 2019).

The affective domain is expressed as a combination of the individual's interest in the unit / unit to be learned, his/her attitude and academic self-confidence (Senemoğlu, 2020). Influencing the learning process of individuals, taking responsibility, and trying; one of the affective domain concepts that requires the development of a positive attitude and interest in the unit to be learned is academic risk-taking behaviour.

Academic risk-taking behaviour is discussed from different perspectives in the literature. Academic risk-taking is a situation in which students make decisions about more difficult or easier assignments to do in academic settings, known or unknown tasks, or sharing or not sharing ideas, and occurs when students choose one of several possible options. These decision-making processes in learning environments can be considered as specific examples of academic risk taking. The first of the two common views about academic risk-taking arises when students can choose from a range of possible options. In this direction, Skaar (2009) expressed academic risk taking as the student's preference for the academically unconventional. Second, these options are accompanied by undesirable consequences specific to the academic setting. For example, students who choose to share their ideas may run the risk of clashing with ideas in the class or of having their ideas rejected or ridiculed by others (Beghetto, 2009). Choosing a difficult and unusual academic task increases the likelihood of a person making mistakes or getting a lower score. Therefore, it can be said that this situation reflects taking more academic risks.

Academic risk taking has an important place in education when it is considered to have implications for various learning processes and outcomes. Strum (1971), in his study examining the relationship between creativity and risk-taking, explained academic risk-taking behaviour as the tendency to take chances, to guess while learning about any question or content, even if there is a possibility of negative results for the opinions or solution suggestions. This definition shows that students' risk taking is also a situation that can measure their mental process of realizing a new or different idea, that is, their ability to think creatively (Varisoglu & Ekinci Çelikpazu, 2019). In the definition made, the willingness and motivation to learn new things come to the fore in academic risk-

taking behaviour. Again, academic risk taking in the literature; the courage and perseverance of people to resist the difficulties they encounter in the learning process; In this process, they are defined as their tendency to prefer difficult and unconventional academic tasks or their willingness to ask questions and test new/different solutions by sharing opinions that are not sure of their accuracy (Neihart, 2010; Skaar, 2009; Beghetto, 2009; Korkmaz, 2002). Clifford (1991), on the other hand, defines academic risk-taking as the choice of academic tasks that vary according to difficulty levels, and states that academic risk-taking behaviours consist of choosing difficult actions, displaying negative behaviours after failure, and recovery after failure.

Although these explanations emphasize cognitive processes in academic risk-taking behaviour, academic risk-taking has an affective nature (Üztemur, Dinç & Acun, 2020). In the literature, there are studies from different disciplines that examine academic risk-taking behaviour from various aspects. Conducted studies examined mainly

-the relationship or tendency between students' risk-taking behaviour in a course and academic success is examined (Nacaroğlu & Yıldırım,2021; Varisoglu & Ekinci Çelikpazu, 2019; Bozpolat & Koç, 2016; Erricker, 2014; İlhan & Çetin, 2013)

-the effect of certain situations on students' cognitive development levels, education level, age, gender, peer relations, competitiveness, parental education, and income level, etc. on academic risk-taking behavior (Daşçı & Yaman, 2014; Majidifard, Shamoossi & Ghourchaei, 2014; Beghetto, 2009; Clifford, Lan, Chou, & Qi, 1989)

-the effect of teaching approaches on academic risk-taking behaviour was determined (Çiftçi, 2006; Korkmaz, 2002),

-tools were developed to measure students' academic risk-taking behaviours specific to a field (İlhan & Çetin, 2013),

-Comparing the students included in the curriculum of the Ministry of National Education with the students included in the International Baccalaureate Diploma Program in terms of academic risk taking, scientific creativity, problem-solving skill levels, and attitudes towards the course (Yaşatürk Midilli 2020),

-students' creative skills/abilities, self-efficacy and self-belief perceptions, perfectionism traits, metacognitive awareness levels, motivations and problem-solving skills, internet use, etc. and academic risk-taking behaviors (Erbaş & Baş, 2015; Odacı, 2013; Beghetto, 2009; Strum, 1971)

-the studies in which activities that encourage students to take academic risks are organized (Devonshire et al., 2014).

Studies examining the relationship between language learning and risk-taking behaviour are also noteworthy. Some of these studies generally examine the relationship between risk-taking and self-evaluation skills in writing skills for second language acquisition or examining the relationship between self-assessment and risk-taking behaviour in speaking ability (Tavakoli & Ghoorchaei 2009) or the relationship between risk taking behaviour and vocabulary learning strategies (Maftoon & Afroukhteh, 2013). However, among the studies in the literature, no study has been found that deals with the relationship between writing anxiety, which directly affects the mother tongue or writing skills (writing in the mother tongue), which constitutes an important part of language skills, and academic risk-taking behaviour.

Writing skills have a special place and importance in the language teaching process. The writing skill, which is one of the four basic language skills that contributes to the language, mental and social development of individuals, needs to be developed systematically. This skill, which can be explained as the expression of thought, can be gained through formal or natural education, and can be accepted as a skill and high-level thinking skill that the individual needs in almost every field of life today. However, in the traditional education approach, writing skill was considered as a secondary skill and students were not interested in expressing themselves in writing, naturally enough time was not allocated to writing skills in the teaching process (Güneş, 2017; Graham & Harris,1988). Today, with the common acceptance that all language skills develop holistically, writing skill has gained importance at least as much as other language skills. However, considering the difficulties involved in writing or acquiring skills in this direction, it is still a challenging process for both individuals in society and students in schools (Uysal & Sidekli, 2020; Arslan, 2018). Problems in the process may cause students to form prejudices against writing and bring along writing anxiety.

Anxiety that negatively affects students' writing performance in the language teaching process is called writing anxiety which negatively affects students' success and mental development in this direction (İşeri & Ünal, 2012). Süğümlü and Alver (2021) explained writing anxiety as one of the affective factors that directly affect students' writing success, motivation, and attitude towards writing. Deniz and Demir (2019) expressed writing anxiety as the tension experienced by the individual before starting the writing process.

In the literature, many studies point out that students with writing anxiety have difficulty in putting their thoughts on paper in a meaningful and structural way and the higher the anxiety of the student, the lower the writing skill (Yılmaz, 2019; Lee, 2016; Mills, Pajares, & Herron, 2006; Abu-Rabia, 2004; Bailey, Onwuegbuzie, & Daley, 2000).

It can be claimed that the lack of sufficient knowledge and self-confidence accompanied with the thought that the product or himself will be evaluated negatively, and behaviours such as feeling

inadequate may cause the emergence of writing anxiety. In the literature review, many studies were found in which writing anxiety was discussed in terms of various variables. It has been observed that some situations in this direction, especially self-efficacy stemming from individual differences, motivation, as well as educational level, gender, parental education level, method/type knowledge, etc., or many variables such as curriculum or teacher behaviour influence writing anxiety (Blasco, 2016; Çocuk, Yanpar Yelken & Özer, 2016; Tekşan, 2012; Zorbaz, 2010).

In the mother tongue curriculum, the importance of developing knowledge/skills for creativity, innovation and risk-taking is emphasized in the areas of competence that students will acquire (MEB, 2019). Writing, which is closely related to high-level cognitive skills and creativity, is an area that requires risk taking and its development contributes to the development of the student in all other areas. From this point of view, the question of whether writing anxiety is related to academic risk-taking behaviour draws attention.

Writing anxiety affects the development of the individual negatively. Academic risk-taking, on the other hand, affects the development of the individual positively, supports learning, and increases the courage and willingness of students to choose difficult operations. Both concepts have the characteristics of affective domain in learning. When evaluated in terms of this feature, the absence of any research examining the relationship between writing anxiety and academic risk-taking behaviour in the literature necessitated this research. In this direction, the aim of the research is whether there is a relationship between middle school students' academic risk-taking behaviours and writing anxiety. Within the framework of the general purpose, the research questions are:

1. Do middle school students' academic risk-taking scores differ significantly in terms of school type, grade level, frequency of reading books, and academic achievement scores in Turkish lessons?
2. Do middle school students' writing anxiety scores differ significantly in terms of school type, grade level, frequency of reading books, and academic achievement scores in Turkish lessons?
3. Is there a significant relationship between the academic risk-taking behaviours of middle school students and their writing anxiety?

Method

Research Pattern

In this study, by examining the relationship between the academic risk-taking behaviour and writing anxiety of middle school students, it is aimed to reveal whether there is a significant

difference between students' academic risk-taking behaviours and writing anxiety in terms of school type, grade level, frequency of reading, and academic success in Turkish lessons. Therefore, the research is in the relational research model. Relational research is based on measuring two or more variables and determining the degree of relationship between them, which is one of the non-experimental quantitative research methods (Christensen, Johnson & Turner, 2015).

Sampling

The sample of the research consists of 493 volunteer students studying in the 5th, 6th, 7th, and 8th grades of middle school. Participants attend middle school in a province (Erzurum) in Turkey in the 2020-2021 academic year. The total number of students studying in middle schools in the specified province is 20,593. In this direction, power analysis was performed on the universe of 20,593 people according to the formula of Barlett, Körtlikk and Higging (2001, p.46). The results obtained show that 377 people are sufficient for the representation of the universe.

Within the scope of the research, 493 people were reached, exceeding the base number of people. Easily accessible sampling method was chosen in the study. This sampling technique was preferred because it provides convenience to the researcher in terms of time, cost, and effort. Patton (2014) defines the convenient / easily accessible sampling method as the researcher tends to the easiest items to reach while forming sample from the universe, which is his or her target. Although this sampling method is not used as a strong sampling method to represent the universe compared to many of the other sampling methods, the reason for choosing this direction in the research is due to the COVID-19 epidemic experienced during the study period and the measures taken to prevent the epidemic in the 5th, 6th, 7th, and 8th grades of middle school. Detailed information on the demographic characteristics of the sample group is given in Table 1.

Table 1. Demographic characteristics of the students participating in the research

School Type	**Public Middle**	**Public imam Hatip**	**Private Middle**			
N	**305**	**131**	**57**			
%	**61.9**	**26.6**	**11.6**			
Grade Level	**5th grade**	**6th grade**	**7th grade**	**8th grade**		
N	**113**	**133**	**139**	**108**		
%	**22.9**	**27.0**	**28.2**	**21.9**		
Frequency of reading books	**Not reding**	**0-100**	**101-200**	**201-300**	**301-400**	**401+**
N	**5**	**173**	**164**	**79**	**38**	**34**
%	**1.0**	**35.1**	**33.3**	**16.0**	**7.7**	**6.9**
Turkish GPA	**0-25**	**26-50**	**51-75**	**76-100**		
N	**13**	**20**	**91**	**369**		
%	**2.6**	**4.1**	**18.5**	**74.8**		

** Imam Hatip Schools (prayer leader and preacher schools) are public educational institutions specialising about teaching classic Islamic courses as well as modern secular scientific curriculum.*

Data Collection Tools

The data of the research were collected with the "Academic Risk-Taking Scale" developed by Clifford (1991) translated into Turkish by Korkmaz (2002), and the "Writing Anxiety Scale" developed by Deniz and Demir (2019). The Academic Risk-Taking Scale is a 5-point Likert-type rating scale for middle school students and consists of 36 items. While there were 3 sub-dimensions in the original of the scale, another sub-dimension was added to the scale in Korkmaz's adaptation. These dimensions are the tendency to have negative feelings after failure, to prefer difficult operations, to recover after failure, to be active, and to not do homework. In Korkmaz's adaptation of the scale, the reliability coefficient was calculated as 0.90 in the application on middle school students. The Writing Anxiety Scale was also developed as a 5-point Likert type for middle school students and consists of 26 items. The scale consists of three sub-dimensions as writing process, avoidance and writing pleasure. Cronbach's Alpha, Spearman Brown and Guttman split-half reliability values of the overall scale and its sub-dimensions, structural reliability of the scale's sub-dimensions and the internal consistency coefficient obtained by the test-retest process are over 70%.

Data Collection Process

Due to the COVID-19 epidemic experienced during the period of the research, the research was conducted online. In this direction, demographic information was added to the Academic Risk-Taking Scale and Writing Anxiety Scale, and the scales were processed into "Google Forms", and then a shareable link was created. The link address was shared with the students studying in the 5th, 6th, 7th and 8th grades of middle school, and the participation of the students in the research was ensured on a voluntary basis. The form, designed through Google forms, was left open for data collection for a week. The students answered all the questions as they were prepared as “needs to be filled”.

Data Analysis

To determine whether the data obtained from the participants showed a normal distribution, the reference intervals determined by Pallant (2016) were considered. The skewness and kurtosis values of all the scales and the items in their sub-dimensions are between +/-2, the data showed normal distribution in the histogram graph, and the p value in the normality tests is greater than .05. These values allowed the correlation analysis to be performed in the study. In addition, Cohen's (1988) standards were taken as reference in the correlation tests. Accordingly, in the correlations obtained from the study; A weak relationship between .10-.29, medium between .30-.49, and higher than .50-1.0 indicate a strong relationship (As cited in Pallant, 2016).

Findings

The descriptive statistics of the average scores of the answers given by the students to the questions on the academic risk-taking and writing anxiety scales are given in Table 1.

Table 1. Descriptive statistics of the average scores of the answers given by the students to the questions of the academic risk-taking and writing anxiety scales.

	Arithmetic Mean	Median	Variants	Standard Deviation	Minimum	Maximum	Range
Academic risk taking	2.65	2.63	0.147	0.383	1.00	4.25	3.25
writing anxiety	2.31	2.27	0.546	0.739	1.00	5.00	4.00

As seen in Table 1, according to the descriptive statistics of the scores of the answers given to the questions of the academic risk-taking and writing anxiety scales, the arithmetic mean of the answers to the questions of the Academic Risk-Taking Scale was 2.65, the median was 2.63, the variance was 0.147, and the standard deviation was 0.383. It was determined that the maximum value was 1.00, the maximum value was 4.25, and the variation width was 3.25. It was determined that the arithmetic mean of the answers to the questions on the Writing Anxiety Scale was 2.31, the median was 2.27, the variance was 0.546, the standard deviation was 0.739, the minimum value was 1.00, the maximum value was 5.00, and the width of variation was 4.00.

The descriptive statistics of the answers given by the students to the Academic Risk-Taking Scale sub-dimensions are presented in Table 2.

Table 2. Descriptive statistics of responses to academic risk-taking sub-dimensions

Sub Dimensions	Arithmetic Mean	Median	Variant	Standard Deviation	Minimum	Maximum	Range
Tendency to have negative feelings after failure	2.74	2.67	0.591	0.768	1.00	5.00	4.00
Tendency to prefer power operations	2.49	2.50	0.250	0.500	1.00	4.40	3.40
The tendency to recover and be effective after failure	2.49	2.45	0.176	0.419	1.00	3.91	2.91
Tendency to not do homework	3.37	3.33	0.550	0.741	1.00	5.00	4.00

According to the descriptive statistics given in Table 2, the arithmetic means of the answers given to the questions of "The tendency to have negative feelings after failure", one of the sub-dimensions of academic risk taking, was 2.74, the median was 2.67, the variance was 0.591, the standard deviation was 0.768, the minimum value was 1.00, the maximum value was 1.00. 5.00 and the change width was determined as 4.00. The arithmetic means of the answers given to the questions “Tension to prefer power operations”, which is another dimension, has a mean of 2.49, a median of 2.50, a variance of 0.250, a standard deviation of 0.500, a minimum value of 1.00, a maximum value of 4.40, and a variation of 3.40. appears to be. Considering the sub-dimension of "recovery and being active after failure", the arithmetic mean of the answers to the questions is 2.49, the median is 2.45,

the variance is 0.176, the standard deviation is 0.419, the minimum value is 1.00, the maximum value is 3.91, and the change and its width was found to be 2.91. Considering the sub-dimension of "not doing homework", it was determined that the arithmetic mean of the answers to the questions was 3.37, the median was 3.33, the variance was 0.550, the standard deviation was 0.741, the minimum value was 1.00, the maximum value was 5.00, and the width of variation was 4.00. determined.

The descriptive statistics of the answers given by the students to the sub-dimensions of the Writing Anxiety Scale are given in Table 3.

Table 3. Descriptive statistics of the answers given to the sub-dimensions of writing anxiety

Sub Dimensions	Arithmetic Mean	Median	Variant	Standard Deviation	Minimum	Maximum	Range
Writing Process	2.62	2.50	0.804	0.896	1.00	5.00	4.00
Avoidance	1.84	1.60	0.695	0.833	1.00	5.00	4.00
Pleasure of writing	2.57	2.50	1.206	1.098	1.00	5.00	4.00

According to the descriptive statistics given in Table 3, the arithmetic means of the answers given to the “Writing process” questions, one of the sub-dimensions of writing anxiety, was 2.62, the median was 2.50, the variance was 0.804, the standard deviation was 0.896, the minimum value was 1.00, the maximum value was 5.00, and the width of change was determined to be 4.00. It is seen that the arithmetic means of the answers given to the "Avoidance" questions, which is another dimension, is 1.84, the median is 1.60, the variance is 0.695, the standard deviation is 0.833, the minimum value is 1.00, the maximum value is 5.00, and the variation width is 4.00. Considering the "pleasure in writing" sub-dimension, it was determined that the arithmetic mean of the answers to the questions was 2.57, the median was 2.50, the variance was 1.206, the standard deviation was 1.098, the minimum value was 1.00, the maximum value was 5.00, and the variation width was 4.00. has been done.

Table 4. Skewness and kurtosis coefficients of academic risk-taking and writing anxiety scales

	Minimum	Maximum	Mean	Std. Deviation	Skewness	Kurtosis
Academic risk taking	1.00	4.25	2.64	.383	-.051	1.857
Writing anxiety	1.00	5.00	2.31	.739	.646	.198

When the descriptive tables of academic risk taking and writing anxiety are examined, it is seen that the parametric assumption about normality is met. In addition, since the skewness and kurtosis values are between +2 and -2, it is assumed that the data show a normal distribution. Pallant (2016) states that the normality coefficient value in social sciences is acceptable between +2 and -2.

In addition, the results of the histogram graph indicate that the data show a normal distribution. Since the normality assumptions were met, parametric tests were started.

Findings Related to the First Research Question

Table 5 presents the ANOVA results regarding whether students' Academic Risk-Taking Scale sub-dimensions and general average scores differ according to school type.

Table 5. ANOVA test results on whether students' Academic Risk-Taking Scale mean scores differ according to school types.

Sub Dimensions	School Type	N	Average± Std.Deviation	F	p	Post-Hoc
Tendency to have negative feelings after failure	Public Middle School	305	2.775±0.752	0.860	0.424	-
	Public imam hatip	131	2.670±0.791			
	Private middle School	57	2.747±0.804			
Tendency to prefer challenging processes	Public middle school	305	2.493±0.505	0.306	0.736	-
	Public imam hatip	131	2.468±0.531			
	Private Middle school	57	2.530±0.403			
The tendency to recover and be effective after failure	Public Middle school	305	2.474±0.404	0.803	0.449	-
	Public imam hatip	131	2.510±0.468			
	Private Middle School	57	2.542±0.387			
Tendency to not do homework	Public middle school	305	3.321±0.756	2.161	0.116	-
	Public imam hatip	131	3.476±0.755			
	Private Middle school	57	3.427±0.603			
Academic Risk-Taking Scale overall average	Public middle school	305	2.650±0.373	0.321	0.725	-
	Public imam hatip	131	2.632±0.423			
	Private middle school	57	2.681±0.349			

*****: p<0.05

As a result of the variance analysis performed to determine whether there is any difference between school types in terms of the mean scores of the Academic Risk-Taking Scale sub-dimensions and general average scores given in Table 5, no significant difference was found in any sub-dimension or general average (p>0, 05).

Table 6 shows the ANOVA results regarding whether the Academic Risk-Taking Scale sub-dimensions and overall mean scores of the students differ according to the classes.

Table 6. ANOVA results of students' Academic Risk-Taking Scale sub-dimension and general average score regarding the class variable

Sub Dimensions	Class	N	Average± Std.Deviation	F	p	Post-Hoc
Tendency to have negative feelings after failure	5	113	2.822±0.739[a]	2.91	0.034*	5. 6. 7. class>8. class
	6	133	2.800±0.762[a]			
	7	139	2.773±0.738[a]			
	8	108	2.555±0.823[b]			
Tendency to prefer challenging processes	5	113	2.424±0.484[b]	2.85	0.037*	8. class>5.class 8. class>7. class
	6	133	2.538±0.485[ab]			
	7	139	2.432±0.449[b]			
	8	108	2.579±0.580[a]			
The tendency to recover and be effective after failure	5	113	2.472±0.424	0.41	0.746	-
	6	133	2.518±0.376			
	7	139	2.471±0.362			
	8	108	2.506±0.526			
Tendency to not do homework	5	113	3.448±0.822[a]	4.001	0.008*	5. 6. class>8.class
	6	133	3.494±0.630[a]			
	7	139	3.348±0.802[ab]			
	8	108	3.185±0.662[b]			
Academic Risk-Taking Scale overall average	5	113	2.657±0.398	1.457	0.226	-
	6	133	2.699±0.333			
	7	139	2.634±0.330			
	8	108	2.599±0.476			

*: $p<0.05$

As a result of the one-way analysis of variance, in which the academic risk-taking tendencies of middle school students were analysed, a significant difference was found between the 8th grade and the other classes in terms of the mean scores of the sub-dimension "Tending to have negative feelings after failure" ($p<0.05$). A significant difference was determined between the 8th grade and the 5th and 7th grades in terms of mean scores in the sub-dimension of “tendency to prefer challenging processes” ($p<0.05$). There was no significant difference in the mean scores of the sub-dimension "recovery after failure and tendency to be active" ($p>0.05$). A significant difference was found between the 8th grade and the 5th and 6th grades in terms of the "tendency to not do homework" sub-dimension score averages ($p<0.05$). Additionally, based on the analysis performed on the general average of the scale, no significant result was reached at the .05 level ($p>0.05$). In this context, it has been determined that academic risk taking differs between certain classes on three dimensions. The results of the ANOVA test on whether the Academic Risk-Taking Scale sub-dimensions and the overall average score of the students differ according to the number of pages they read are presented in Table 7.

Table 7. ANOVA results of students' Academic Risk-Taking Scale sub-dimension and overall score averages on the number of reading pages

Sub Dimensions	How many pages have been read	N	Average± Std.Deviation	F	p	Post-Hoc
Tendency to have negative feelings after failure	Not reading	5	2.833±0.429[ab]	2.011	0.04*	201-300 > 0-100
	0-100	173	2.600±0.638[b]			
	101-200	164	2.806±0.775[ab]			
	201-300	79	2.921±0.827[a]			
	301-400	38	2.719±0.922[ab]			
	401 or above	34	2.779±0.958[ab]			
Tendency to prefer power operations	Not reading	5	2.820±0.669[a]	2.936	0.013*	Not reading>201-300. 301-400 and 401 above
	0-100	173	2.562±0.457[ab]			
	101-200	164	2.513±0.492[ab]			
	201-300	79	2.382±0.485[b]			
	301-400	38	2.329±0.475[b]			
	401or above	34	2.415±0.688[b]			
The tendency to recover and be effective after failure	Not reading	5	2.782±0.344[a]	3.010	0.011*	Not reading > 101-200. 201-300. 301-400 and 401 and above
	0-100	173	2.545±0.415[ab]			
	101-200	164	2.509±0.378[b]			
	201-300	79	2.420±0.402[b]			
	301-400	38	2.316±0.371[b]			
	401or above	34	2.455±0.624[b]			
Tendency to not do homework	Not reading	5	3.667±1.027[a]	2.468	0.032*	Not reading > 401 and above
	0-100	173	3.264±0.720[ab]			
	101-200	164	3.447±0.703[ab]			
	201-300	79	3.460±0.765[ab]			
	301-400	38	3.544±0.761[ab]			
	401or above	34	3.157±0.830[b]			
Academic Risk-Taking Scale overall average	Not reading	5	2.883±0.115	1.347	0.243	-
	0-100	173	2.628±0.341			
	101-200	164	2.687±0.369			
	201-300	79	2.663±0.375			
	301-400	38	2.556±0.443			
	401or above	34	2.610±0.571			

*: $p<0.05$

As noted in Table 7, there was a significant difference between those who read between 201-300 pages and those who read between 0-100 pages in terms of the mean scores of the sub-dimension "tendency to have negative feelings after failure" ($p<0.05$). However, a significant difference was determined between those who did not read books and those who read 201 pages or more in terms of the mean scores of the sub-dimension "Tension to prefer power operations" ($p<0.05$). Again, a significant difference was found between those who did not read a book and those who read 101 pages or more in terms of the mean scores of the sub-dimension "Recovery after failure and tendency to be active" ($p<0.05$). There was also a significant difference between those who did not read a book

and those who read 401 pages or more in terms of the mean scores of the sub-dimension "Tension not to do homework" ($p<0.05$).

In terms of overall score averages of the "academic risk taking" scale, there was no significant difference in terms of the number of pages in reading books ($p>0.05$).

Table 8 presents the results of the ANOVA test on whether the sub-dimensions of the Academic Risk-Taking Scale and the general average score of the students differ according to the academic achievement scores of the Turkish course.

Table 8. ANOVA test results on whether students' Academic Risk-Taking Scale sub-dimension and general score averages differ according to the academic achievement score of the Turkish course.

Sub Dimensions	Turkish score	N	Average± Std.Deviation	F	p	Post-Hoc
Tendency to have negative feelings after failure	0-25	13	2.853±0.986[a]	3.158	0.025*	0-25 > All Groups
	26-50	20	2.433±0.575[b]			
	51-75	91	2.582±0.716[b]			
	76-100	369	2.797±0.775[b]			
Tendency to prefer challenging processes	0-25	13	2.515±0.641	0.954	0.414	-
	26-50	20	2.495±0.315			
	51-75	91	2.569±0.507			
	76-100	369	2.471±0.502			
The tendency to recover and be effective after failure	0-25	13	2.587±0.635	1.433	0.232	-
	26-50	20	2.618±0.394			
	51-75	91	2.533±0.422			
	76-100	369	2.471±0.411			
Tendency to not do homework	0-25	13	3.308±1.134	2.367	0.070	-
	26-50	20	3.033±0.996			
	51-75	91	3.282±0.745			
	76-100	369	3.418±0.704			
Academic Risk-Taking Scale overall average	0-25	13	2.716±0.671	0.744	0.526	-
	26-50	20	2.557±0.251			
	51-75	91	2.622±0.384			
	76-100	369	2.659±0.376			

*: $p<0.05$

A significant difference was found between those with grades between 0-25 and the other score groups in terms of the average score of the sub-dimension "tendency to have negative feelings after failure" ($p<0.05$). In terms of the mean scores of the other sub-dimensions of the academic risk-taking Scale and the overall mean scores, there was no significant difference compared to the Turkish course grades ($p>0.05$).

Findings Related to the Second Research Question

ANOVA test results regarding whether students' Writing Anxiety Scale sub-dimensions and overall mean scores differ according to school types are as in Table 9.

Table 9. ANOVA results on whether students' Writing Anxiety Scale sub-dimensions and overall score averages differ according to school types.

Sub Dimensions	School Type	N	Average± Std.Deviation	F	p	Post-Hoc
Writing Process	Public middle school	305	2.604±0.902	1.063	0.346	-
	Public imam hatip	131	2.711±0.927			
	Private middle school	57	2.520±0.793			
Avoidance	Public middle school	305	1.854±0.876	0.478	0.621	-
	Public imam hatip	131	1.786±0.785			
	Private middle school	57	1.904±0.702			
Pleasure of writing	Public middle school	305	2.561±1.124[b]	3.902	0.021*	Private middle school> İmam hatip middle school and Public middle school
	Public imam hatip	131	2.439±1.041[b]			
	Private middle school	57	2.921±1.024[a]			
Writing Anxiety Scale overall average	Public middle school	305	2.309±0.763	0.056	0.945	-
	Public imam hatip	131	2.313±0.727			
	Private middle school	57	2.345±0.640			

*: p<0.05

There is no difference between school types (p>0.05) in terms of the mean scores of the "writing process" and "avoidance" sub-dimensions of the Writing Anxiety Scale, and when the mean scores of the "pleasure in writing" sub-dimension are taken into account, it is observed that private middle school students and public middle school and official It was found that there was a significant difference between the students of imam hatip middle schools.

The results of the ANOVA test regarding whether the sub-dimensions of the Writing Anxiety Scale and the general average score of the students differ according to the classes are as in Table 10.

Table 10. ANOVA results on whether students' Writing Anxiety Scale sub-dimension and overall mean scores differ according to grades.

Sub Dimensions	Class	N	Average± Std.Deviation	F	p	Post-Hoc
Writing process	5	113	2.543±0.887	1.951	0.121	-
	6	133	2.625±0.903			
	7	139	2.552±0.872			
	8	108	2.796±0.919			
Avoidance	5	113	1.903±0.923	1.751	0.156	-
	6	133	1.817±0.794			

	7	139	1.729±0.782			
	8	108	1.954±0.837			
	5	113	2.423±1.026[b]			
Pleasure of writing	6	133	2.607±1.092[ab]	4.029	0.008**	8th class>5th class
	7	139	2.432±1.126[b]			8th class>7th class
	8	108	2.859±1.095[a]			
	5	113	2.278±0.739[b]			
Writing Anxiety	6	133	2.311±0.741[ab]	2.780	0.041*	8th class> 5th class
Scale overall average	7	139	2.217±0.740[b]			8th class>7th class
	8	108	2.482±0.717[a]			

**: p<0.01

There was no significant difference between the classes in terms of the mean scores of the "Writing process" and "Avoiding" sub-dimensions (p>0.05). A significant difference was identified between the 8th grade and the 5th and 7th grades in terms of the mean scores of the “pleasure of writing” sub-dimension (p<0.01). Again, a significant difference was found between the 8th grade students and the 5th and 7th grade students in terms of the overall score averages of the "Writing Anxiety" scale (p<0.05).

The results of the ANOVA test on whether the students' Writing Anxiety Scale sub-dimensions and overall average score differ according to the number of pages in reading books are presented in Table 11.

Table 11. ANOVA results on whether students' Writing Anxiety Scale sub-dimension and overall score averages differ according to the number of pages they read.

Sub Dimensions	How many pages have been read	N	Average± Std.Deviation	F	p	Post-Hoc
	Not reading	5	3.283±1.157[a]			
	0-100	173	2.728±0.841[b]			
Writing Process	101-200	164	2.574±0.828[b]	1.438	0.013*	Not reading > Other Groups
	201-300	79	2.525±0.907[b]			
	301-400	38	2.564±1.010[b]			
	401 or above	34	2.517±1.223[b]			
	Not reading	5	2.100±0.889			
	0-100	173	2.002±0.896			
Avoidance	101-200	164	1.749±0.645	1.430	0.054	-
	201-300	79	1.701±0.791			
	301-400	38	1.729±0.875			
	401or above	34	1.885±1.199			
	Not reading	5	2.700±1.137			
	0-100	173	2.785±1.143			
Pleasure of writing	101-200	164	2.518±0.979	1.373	0.068	-
	201-300	79	2.386±1.103			
	301-400	38	2.368±1.081			
	401or above	34	2.368±1.288			
	Not reading	5	2.738±0.989[a]			
	0-100	173	2.458±0.741[ab]			
Writing Anxiety Scale	101-200	164	2.248±0.621[b]	2.601	0.025*	Not reading > 101 and above
overall average	201-300	79	2.187±0.745[b]			
	301-400	38	2.213±0.802[b]			
	401 or above	34	2.251±1.007[b]			

*: p<0.05

In terms of the mean scores of the "writing process" sub-dimension, there is a significant difference between those who did not read and those who read according to the number of pages in reading (p<0.05).

"Avoiding" and "Pleasure of writing" sub-dimensions were not found to be significant in terms of mean scores (p>0.05).

A significant difference was found between those who did not read a book and those who read 101 pages or more in terms of the overall score averages of the "writing anxiety" scale (p<0.05).

The results of the ANOVA test on whether the students' Writing Anxiety Scale sub-dimensions and general point averages differ according to their Turkish course academic achievement scores are presented in Table 12.

Table 12. ANOVA results on whether students' Writing Anxiety Scale sub-dimension and overall score averages differ according to the academic achievement score of the Turkish course.

Sub Dimensions	Turkish score	N	Average± Std.Deviation	F	p	Post-Hoc
Writing process	0-25	13	2.821±1.070[ab]	6.273	0.001**	26-50 > 76-100
	26-50	20	3.113±0.909[a]			
	51-75	91	2.878±0.954[ab]			
	76-100	369	2.526±0.856[b]			
Avoidance	0-25	13	2.446±1.206[a]	4.891	0.003**	0-25 > 51-75 ve 76-100
	26-50	20	2.155±0.910[ab]			
	51-75	91	1.968±0.840[b]			
	76-100	369	1.772±0.799[b]			
Pleasure of writing	0-25	13	2.942±1.525	0.852	0.466	-
	26-50	20	2.800±0.934			
	51-75	91	2.569±1.103			
	76-100	369	2.545±1.089			
Writing Anxiety Scale overall average	0-25	13	2.695±0.904[a]	5.908	0.001**	0-25 > 76-100 26-50 > 76-100
	26-50	20	2.696±0.824[a]			
	51-75	91	2.481±0.769[ab]			
	76-100	369	2.239±0.706[b]			

**: p<0.01

A significant difference was found between those with scores between 26-50 and 76-100 according to the academic achievement score of the Turkish course in terms of the "writing process" sub-dimension score averages (p<0.01). A significant difference was found between those with academic achievement scores between 0-25 and those with 51-75 and 76-100 scores in terms of "avoidance" sub-dimension mean scores (p<0.01). In terms of the mean scores of the other sub-dimensions of the Writing Anxiety Scale, there was no significant difference between the academic achievement scores of the Turkish course (p>0.05).

In terms of the overall score averages of the "writing anxiety" scale, a significant difference was found between those who scored between 76-100 and those whose scores were between 0-25 and 26-50, according to their Turkish course academic achievement scores ($p<0.01$).

Findings Regarding the Third Research Question

According to the second question of the research, the results of the correlation analysis between academic risk taking and writing anxiety scales are presented in Table 13.

Table 13. Correlation analysis results between academic risk taking and writing anxiety scales overall score averages

	Academic Risk taking	Writing Anxiety
Academic Risk Taking	1	-.32**
Writing Anxiety		1

**: p<0.01

According to the results of the correlation analysis between the Academic Risk-Taking Scale and the Writing Anxiety Scale, it was determined that there was a moderately significant negative relationship (r=-.32). Accordingly, as students' writing anxiety increases, their academic risk-taking levels decrease.

The results of the correlation analysis between the academic risk taking and writing anxiety sub-dimension mean scores of the students are presented in Table 14.

Table 14.Correlation analysis results between academic risk taking and writing anxiety subdimension mean scores

	Tendency to have negative feelings after failure	Tendency to prefer challenging processes	The tendency to recover and be effective after failure	Not doing homework	Writing process	Avoidance	Pleasure of writing
Tendency to have negative feelings after failure	1	.044	.176**	.310**	-.598**	-.331**	-.079
Tendency to prefer challenging process		1	.528**	-.079	.084	.037	.344**
The tendency to recover and be effective after failure			1	-.031	.003	.040	.292**
Not doing homework				1	-.334**	-.438**	-.160**
Writing process					1	.619**	.249**
Avoidance						1	.411**
Pleasure of writing							1

**: p<0.01

There was a high negative level correlation & relation (r=-.60) between the sub-dimension of the tendency to have negative feelings after failure and the writing process sub-dimension; Among the

avoidance sub-dimensions, there was a moderate negative (r=-.33); A significant relationship was found. Tendency to prefer challenging processes sub-dimension and pleasure of writing sub-dimension in the positive direction moderate (r=.34); There is a low level of positive (r=.29) significant correlation between the sub-dimension of the tendency to recover after failure and to be active and the Pleasure of Writing sub-dimension. Negatively moderate level (r=-.33) between not doing homework sub-dimension and Writing process sub-dimension; Negatively moderate (r=-.44) with avoidance sub-dimension; There was a low negative (r=-.16) significant relationship between the writing pleasure sub-dimension.

When Table 14 is examined, it is seen that there is a strong positive relationship between the academic risk-taking and the writing anxiety scales' own sub-dimensions. Since this situation is not within the scope of the research questions, the explanation is not included.

Results

Conclusion and Discussion

The aim of the study is to determine whether there is a relationship between the academic risk-taking levels of middle school students and their writing anxiety. Within this framework, firstly, students' academic risk-taking behaviours and writing anxiety were discussed in terms of the determined variables, and then the relationship between them was identified. The results of the research are as follows:

According to the first question of the research;

1. There is no significant difference in the academic risk-taking general average score of middle school students in terms of school type. It has been observed that the type of school the students attend does not have an impact on academic risk taking in the mother tongue course.

2. There is no significant difference in the academic risk taking general average score of the students according to their grade levels. Different results have been obtained in some studies in the literature. Daşçı and Yaman (2014) examined the effects of students' cognitive development periods and education levels on their mental risk-taking skills and concluded that students' mental risk-taking skills decrease as the education level increases. The mental risk-taking levels of the students in the first category are higher than the risk taking levels of the students in the second category. Similarly, Beghetto (2009) found that as the age of the students increased, their risk-taking behaviours decreased. Conversely, Clifford et al. (1990) examined the factors affecting students' motivations and risk-taking behaviours amongst 4th, 6th, and 8th grade students and concluded that risk-taking behaviour increased with development.

The research was carried out during the distance education period of the 2020-2021 academic year due to the COVID 19 epidemic. This result suggests that the negative effects of the epidemic on the academic risk-taking behaviours are also seen on students who are not in the real classroom environment.

There is a significant difference in the mean scores of the students according to the sub-dimensions in terms of grade levels. There is also a significant difference between the 8th grade and the other classes in terms of the mean scores of the sub-dimension "tendency to have negative feelings after failure". 5th, 6th, and 7th graders tend to have more negative feelings after failure than 8th graders. There is a significant difference between the 8th grades and the 5th and 7th grades in terms of mean scores in the sub-dimension of "tendency to prefer power operations". This shows that 8th graders tend to prefer more challenging process than 5th and 7th graders. There is a significant difference between the 8th grade and the 5th and 6th grades in terms of the mean scores of the "tendency to not do homework" sub-dimension.

5th and 6th graders tend to not do more homework than 8th graders. As the grade level increases, the tendency of students to prefer challenging processes increases, and the tendency to not do homework decreases. There is no significant difference in the mean scores of the sub-dimension "Recovery after failure and tendency to be effective". According to these results, it can be said that academic risk taking differs between certain classes on three dimensions.

Another study in which a significant difference was determined according to the sub-dimensions of the Academic Risk-Taking Scale was conducted by Korkmaz (2002). In this study, in which the effect of different learning approaches on academic risk-taking behaviour was examined, there was a significant difference in terms of the mean scores of the sub-dimensions of reflecting the tendency to have negative feelings after failure, to prefer challenging processes, to reflect the tendency to recover after failure and to be effective, to reflect the tendency to not do homework, in favour of the experimental group.

3. There is no difference in the academic risk-taking general score averages of the students according to the number of reading pages. However, the research reveals that there are significant differences in terms of sub-dimensions. In terms of the "tendency to have negative feelings after failure" sub-dimension, there is a significant difference between those who read between 201-300 pages and those who read between 0-100 pages. Students who read more books tend to have negative feelings after failure than those who read less. There is a significant difference between those who do not read books and those who read 201 pages or more in terms of the mean scores of the "tendency to prefer power operations" sub-dimension. There is a significant difference between those who do not read books and those who read 201 pages or more in terms of the mean scores of the "tendency to

prefer challenging processes" sub-dimension. Students who do not read books tend to prefer more challenging processes than those who do. This result suggests that students are more cautious in displaying academic risk-taking behaviour as their learning and/or awareness level increases as they read. In a study conducted by Bozpolat and Koç (2016), it was claimed that students with a high tendency to prefer difficult operations are willing to take academic risks.

The level of awareness of students' behaviour in mathematics was also effective in their preference for challenging operations in mathematics.

There is a significant difference between those who do not read a book and those who read 101 pages or more in terms of the mean scores of the sub-dimension of "recovery after failure and tendency to be active". Students who read less books tend to recover more and be more effective after failure than those who read more. There is a significant difference between those who do not read books and those who read 401 pages or more in terms of the mean scores of the sub-dimension of "tendency to not do homework". It is seen that students who do not read books tend not to do homework more than those who do.

4. There is no difference in the academic risk-taking general average score of the students according to the academic achievement scores of the mother tongue course. On the other hand, there is a significant difference in only one sub-dimension of the scale. Students with an academic success score between 0-25 tend to have negative feelings after failure compared to students with higher success scores. This result shows that as the academic success of the students increases, they tend to have fewer negative feelings even if the risk-taking behaviour results in failure. According to motivation theorists, measured risk-taking behaviour increases intrinsic motivation, enabling cognitive development to progress and giving constructive responses to failure (House, 2002, p. 13). İlhan, Çetin, Öner Sünkür, and Yılmaz (2013) emphasized that academic risk-taking behaviour is effective on students' academic success in their study, where they found a significant relationship between study skills and academic risk taking. In another study (Gündoğdu, Korkmaz, & Karakış, 2005) examining risk-taking behaviour and academic achievement in high school students, a significant relationship was found between risk-taking behaviour and academic success. According to the findings of the study, individuals who show risk-taking behaviour have higher academic success.

According to the second question of the research;

1. Students' writing anxiety average score does not change according to the type of school. However, when the sub-dimensions of the scale are examined, there is a significant difference between private middle school students, imam hatip middle school and public middle school students in terms of "writing pleasure". Private middle school students feel more pleasure in writing.

2. The general average score of students' writing anxiety varies according to their grade level. 8th graders have more writing anxiety than 5th and 7th graders. It is seen that as the grade level increases, the writing anxiety also increases. This result obtained in the research is in parallel with the studies of Zorbaz (2010), Aşılıoğlu and Özkan (2013), Akaydın and Ateş (2015) and Yılmaz (2019). Their research points that the anxiety levels of 8th grade students are higher than those of lower grade students. In terms of the sub-dimensions of the scale, there is no significant difference between the classes according to the "Writing process" and "Avoidance" sub-dimensions. There is a significant difference between the 8th grade and the 5th and 7th grades in terms of the "pleasure of writing" sub-dimension. According to these results, 8th graders have higher writing anxiety, but they feel more pleasure to write than 5th and 7th graders.

3. The general average score of students' writing anxiety varies according to the number of pages in the book. Students who do not read books have more writing anxiety than students who read 101 or more pages. According to the sub-dimensions of the scale, there is a significant difference between the non-readers and the other groups in terms of the "Writing process". Those who do not read books present more anxiety in the process.

4. Students' writing anxiety average score varies according to the academic achievement score of the mother tongue course. In this case, there is a significant difference between those with a score between 76-100 and those with a score of 0-25 and 26-50. Students with a success score between 0-25 and 26-50 have more writing anxiety than students with a score between 76-100. In terms of the "writing process" sub-dimension, there is a significant difference between those with scores between 26-50 and 76-100. In this case, students with a score between 26-50 feel more anxiety in the process. In terms of the "avoidance" sub-dimension, there is a significant difference between those with scores between 0-25 and those with 51-75 and 76-100 scores. Students with a success score between 0-25 avoid writing more.

According to the third question of the research;

1. There is a moderately significant negative correlation between students' academic risk-taking behaviours and writing anxiety. Accordingly, it can be said that as students' writing anxiety increases, their academic risk-taking levels decrease.

Academic risk-taking behaviour is generally explained as the responsibility that students take in situations where they do not know/predict the outcome, which may result in success or failure, and the desire to learn something new (Varışoğlu & Ekinci Çelikpazu, 2019). In this sense, an increase in the desire to take academic risks may be effective in reducing the anxiety felt when starting any assignment/task. At the same time, high level of anxiety may prevent academic risk-taking behaviour.

Different results were obtained in studies examining the relationship between academic risk-taking behaviour and other language skills. In a study examining the relationship between academic risk-taking and verbal expression skills (Majidifard et al., 2014), it was found that there was no significant relationship between Iranian students' risk-taking behaviours and verbal expression proficiency. In the study conducted by Farahani and Hivechi (2013), the relationship between risk taking and self-assessment skills in writing skills of students learning English as a foreign language was examined. The results of the study revealed that there is no relationship between risk-taking behaviour and self-evaluation skills. Students who took high risk did not take risks in terms of using compound sentences or new sentence structures in their written expressions. In Tavakoli and Ghoorchaei's (2009) study examining the relationship between self-assessment and risk-taking behaviour in speaking ability, no significant relationship emerged between students' risk-taking behaviours and their self-evaluation in speaking skills. It was observed that students who took high risk tended to evaluate their speaking abilities more than students who took medium and low risk and acted cautiously.

According to the results of the correlation analysis between the sub-dimensions of the Academic Risk Taking and Writing Anxiety scales, there is a highly significant negative correlation between the sub-dimension of "Tending to have negative feelings after failure" and the "Writing process" sub-dimension. This finding can be interpreted as the students' tendency to have negative feelings after failure increased, and their anxiety during the writing process decreased. The fact that students have less anxiety during the writing process suggests that they can be more effective in writing skills and if they fail at the end of the process, they will tend to have more negative feelings.

A moderately significant negative correlation was found between the sub-dimension of "The tendency to have negative feelings after failure" and the "Avoidance" sub-dimension. As students' avoidance of writing increases, their tendency to have negative feelings after failure decreases. This result may show that students do not want to write.

Between the sub-dimension "Tendency to prefer challenging processes" and "Pleasure of writing" sub-dimension, positive and moderate; There is a low level of positive correlation between the sub-dimension "Recovery after failure and the tendency to be effective" and the "Pleasure of writing" sub-dimension. This result suggests that as the tendency of students to prefer challenging processes and to recover and be effective after failure increases, they feel more pleasure from writing.

There is negatively moderate level relationship between "not doing homework" sub-dimension and "Writing process" sub-dimension; Negatively moderate to "avoidance" sub-dimension; There is negative and low-level significant relationship between the “pleasure of writing” sub-dimension. As students' tendency not to do homework increases, they worry less about the writing process, avoid writing less, and feel less pleasure in writing.

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An Evaluation of John Taylor Gatto's Opposition to Compulsory School Education

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Abstract

Education has an important role in people's lives, both individually and socially. For this reason, it is accepted by almost everyone that education has a decisive power in the economic development and multi-faceted improvement of societies. From this point of view, education systems, which are among the most important institutional structures of the society, have been formed in order to provide a better education service to the individuals of all countries. Different approaches have been introduced on the establishment, functions and efficiency of education systems from past to present. These different approaches and perspectives can contribute to benefiting more from the power of education in increasing the effectiveness of education systems and providing all aspects of social development through education. However, completely opposing the education system and schools and arguing that it is unnecessary is incompatible with the reality of the life we live today. This study aims to make a scientific and academic evaluation of the criticisms of an American retired teacher named John Taylor Gatto on compulsory and public education. As it is known, John Taylor Gatto's popular book Weapons of Mass Instruction: A schoolteacher's journey through the dark world of compulsory schoolıng (2009; in Turkish 2018) made an impact all over the world and started an important discussion compulsory education. With the publication of mentioned book, John Taylor Gatto's thoughts on compulsory and public education have recently become the agenda all over the world, as well as in Turkey. The aim of the study is to bring a different perspective to this debate, to put forward the necessity of compulsory and public education with its scientific justifications. It also aims to correct the wrong perceptions that emerged with the publication of the books by John Taylor Gatto. Case study, one of the qualitative research methods, was used in the study. In this research, John Taylor Gatto's views on compulsory education and schools, which he included in his books and writings, especially in his book, "Weapon of Mass Instruction", which has also been translated into Turkish, has been discussed and scientifically criticized. From the findings and evaluations, it has been concluded that Gatto's thoughts on education do not have a counterpart in today's and future world in many ways and do not comply with scientific facts.

Keywords: Critical pedagogy, Compulsory education, John Taylor Gatto, Public education, Education for the future

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Introduction

Education has played an important role in the development of humanity, both at the individual and societal levels. It is accepted by almost everyone that education has a decisive power in the economic development and multi-faceted development of societies. Education systems, which are institutional structures, have been formed in every country as a result of the need to give compulsory education to all individuals by the state and for a certain period of time. Education is carried out in schools on a substantial and massive level. Schools form the basis of the education systems. Every nation has its own values, traditions and historical development processes. Depending on these facts, the education systems of each country differ from others. Countries' educational goals, educational policies and practices in schools also change. Today, every society is making a great effort to improve its education system and make it more effective. As in the past, planned education maintains its importance in today's conditions and in the near future and will continue to do so for a while. For this reason, the right to receive a modern and qualified education is seen among the most basic human rights in the developed world. In this context, the task of creating a qualified education system is among the most fundamental responsibilities of the states and governments. Thus, they will be able to provide all their citizens with the skills they need. In short, “the school has been one of the most indispensable institutions of all periods” (Uçak and Doğan, 2020) and it still continues to be so now and in the future.

While this is the case, it is understood that the book of an American retired teacher named John Taylor Gatto, which has been published in many countries recently and which rejects education, has attracted great attention. John Taylor Gatto's popular book *Weapon of Mass Instruction A Schoolteachers’ Journey Through the Dark World of Compulsory Schooling* (Gatto, 2009) has rekindled an important debate around the world. In the book, education, which was thought to save humanity for centuries, even thousands of years, is actually presented as a weapon that destroys people in mass.

Along with his mentioned book, other books by John Taylor Gatto has similar ideas in his other books, articles and also in interviews with him. These ideas have recently become on the agenda in the education world. By at least some people, Gatto’s ideas are considered a critique for the current approaches and practices of education within the framework of critical pedagogy. Yet, his thoughts should be seen as a total objection against compulsory schooling and public education. When we examine and analyze Gatto’s expressions in his books (Gatto, 2005; Gatto, 2009; Gatto, 2018), it is seen that these criticisms and thoughts are not within the scope of critical pedagogy. As it is known, there are some criticisms and different approaches about the inequality of opportunity in education, quality of education, practices of education and so on. The field of critical pedagogy has

emerged as a result of the criticisms. Critical pedagogy also encompasses the use of the economic and political power of education in favor of the advantaged classes of society.

Critical pedagogy is an educational approach created with the thoughts of people such as Paulo Freire (2004), Peter McLaren (1995), and Ivan Illich (2006). It brought a different perspective to education around the world in a short time with the criticisms it directed towards existing educational practices and it became a new approach in educational sciences. “It can be said that there are two important factors behind the critical pedagogy gaining such an important and meaningful academic ground, political support and social sensitivity in a short time: First, the inadequacy of educational approaches and practices that defend the current status quo; the second one is the advantages of Critical Pedagogy” (İnal, 2018), thus, the justification of its arguments about educational policies carried out around the world.

In this respect, critical pedagogy is an approach that criticizes education and school with its existing structure and practices, rather than rejecting public education and schooling. Thus, critical pedagogy does not handle education completely unnecessary and harmful. Gatto's criticisms, on the other hand, are an understanding that completely rejects school and education. Therefore, it cannot be handled within the framework of critical pedagogy.

The Emergence of Compulsory Education and Its Basis

The phenomenon of education goes as back as the history of humanity. It is through education that people transfer their own experiences, knowledge and thoughts about life to other individuals. However, in periods when life and living conditions were simpler, social structures also consisted of smaller groups. Complex social structures and institutions did not exist at the present level. At that time, education was given informally as a part of daily life, mostly by family members and other individuals around. As social relations have become more intense and complex, educational activities carried out in informal ways have also changed. This change has also affected the scope and quality of education. The changes that occurred as a result of this interaction necessitated that education should be given to all individuals of the society in a more systematic and qualified manner. In order to meet this need, specially designed environments have been created. Although their characteristics and features differ, these specially created environments aimed to provide educational activities more effectively and efficiently. These educational institutions are called schools. Depending on the political, economic and scientific development of the societies, the establishment of a more qualified education system has become a necessity for all developed countries (Topcu, 2020, 1).

The basis of today’s modern education systems is based on the Renaissance and Reformation movements that emerged in the 15th and 16th centuries and the Enlightenment Era that developed

later. The positivist thought formed by the change in the scientific field, the individual rights and freedoms shaped by the French Revolution in the social field, the changes in the economic field with the industrial revolution and the developments in the political field have made the functions of education more evident.

Thus, starting from the 18th century, the period of formal education has begun through education systems that attach importance to their social, political and economic functions. It is seen that instead of the religion-centered education approach of the Middle Ages, the way for individuals to be educated with a scientific, rational and libertarian approach and in more democratic environments has been paved. The school system based on students' age and their development has been developed. This system has standard curriculums and textbooks. It transfers scientific knowledge and national values. It has teachers who are the representatives of rationality. It is an education system based on the reproduction of modernity (İnal, 2018).

The transformations that are effective in the formation of the modern education system are seen in four main areas:

1. ***Scientific and technological change:*** Studies of scientists and philosophers based on rational thought, experimentation and observation have led to important leaps in the scientific field. With the contributions of scientists such as Descartes, Gilbert, Newton, Laplace, Copernicus, Galilei, Kepler, and thinkers such as Bacon, Voltaire, Hume, Rousseau, Locke, Humboldt, Diderot, and Kant, the scientific revolution took place and the way to the industrial revolution was opened.
2. ***Economic change***: Along with the Industrial Revolution, great changes have occurred in the field of production and consumption. One of the most important situations that emerged with the revolution is the need for trained manpower. This need has been one of the most important factors in the spread of education to large masses of people. Along with industrialization, the development of human intelligence and abilities has also gained importance. It has been accepted that this development is only possible through education. Education and vocational training practices that have existed for a long time in the history of humanity have turned into a more professional way.
3. ***Political change***: After the French Revolution, a new model of political organization emerged, giving importance to individual rights and freedoms and democratic values. This change has led to the establishment of nation states. These modern democratic states, which are called nation states, had to use education effectively through appropriate programs in order to maintain the political structure they established.

4. ***Social change***: The changes briefly summarized above actually led to changes in the social structure. Changes in production and consumption, cultural formations required by the new situation and the prevention of social conflicts necessitated schools and compulsory education as a tool.

All these changes also affected the educational approaches, which were transcendent, scholastic, dictatorial and mystical, especially in the periods when religious institutions were the only determinant. Along with the disciplines such as pedagogy, pediatrics, psychology, etc., the new education was formed in order to train the labor force needed by the bourgeois class for commercial and industrial works. The new nation-state structure also supported this economic base of the bourgeoisie politically. Public school systems were established in order to benefit more from education within the framework of various ideals such as economic and social development (İnal, 2018).

The process of creating and making modern compulsory education systems in different geographies has also differed according to the countries. Education has played a fundamental role in the political, economic and social development and social integration of countries in the 20th century. Compulsory education has been the basic element for the independence and sovereignty of the nation states. The idea that education can be a panacea, a solution to every problem, and therefore education can solve all kinds of problems, has become widespread (Weymann, 2010). Although there are always criticisms about the content, quality and problems of education, this idea still maintains its validity. As Çengel (2021) emphasizes, "education has many important goals such as "establishing scientific thinking, developing a culture of inquiry and research, raising the general cultural level of the country, and equipping tomorrow's adults with the necessary knowledge, skills and universal values". Based on these basic objectives, education prepares individuals to live successfully and happily in the democratic society of tomorrow as citizens who respect basic human rights and freedoms. It enables all individuals to be competitive all over the world as a global citizen. From this point of view, education will continue to exist as an indispensable institutional structure for all societies.

Method

Research Design

In this study, case study, one of the qualitative research methods, was used. In qualitative research, researchers generally examine the way participants interpret their experiences, their perspectives on the events, what they learn from their experiences and what they reveal. In this aspect, researchers in qualitative research use words rather than numbers (Merriam & Tisdell, 2016). Qualitative research methods are widely used in the field of educational sciences as well as in social

sciences such as anthropology, sociology, etc. The research is a study in accordance with the document analysis technique. So Gatto's views which he shared in his books and interviews on education were analyzed and evaluated with document analysis technique in this research.

Document review is the scanning, examination and analysis of written sources about facts and events related to the subject. Data collection through documentation includes the process of collecting and analyzing written materials related to the events and phenomena that are considered to be investigated. If the data required by the research can be obtained from the relevant documents, an analysis and evaluation may occur without the need for data collection in different ways (Yıldırım & Şimşek, 2006).

Data Collection

The data of the research were obtained from written and printed sources deemed necessary. The data of this study includes his thoughts on various platforms, especially the books he has published, as well as the opinions of different researchers on the subject. Qualitative data consists of information obtained directly from people's own lives through experiences, opinions, interviews. These data can also be collected and evaluated through direct quotations from the documents related to the subject (Patton, 2015, p.14). In its broadest sense, the term document encompasses printed materials related to a work, books that refer to it, official records, personal documents, and all visual documents, including popular culture and popular media (Merriam & Tisdell, 2016, p.24-25).

Research Material

Within the scope of this research, it has been tried to reach the author's own books, articles and interviews about the subject. Searches were made on the internet and using various search engines regarding the work of other people on the subject, as well. The sources found are given in Table 1 below.

Table1. Resources published by Gatto and directly related to the subject

Author	Source	Type	Published by
J. T. Gatto (2017)	The Underground History of American Education	Book	Oxford Schooling Press
J. T. Gatto (2009)	Weapons of Mass Instruction	Book	New Society Publishers
J. T. Gatto (2018)	Eğitim Bir kitle İmha Silahı (Turkish)	Book	Edam
J. T. Gatto (2007)	Dumbing Us Down	Book	New Society Publishers
J. T. Gatto (2019)	Aptallaştıran Eğitim (Turkish)	Book	Pedagoji
J. T. Gatto	Schooling is Not Education (Retrieved on: 09.04.2021)	Interview	https://www.naturalchild.org/
J. T. Gatto	Everything We Think About Schooling Is Wrong (Retrieved on: 12.07.2021)	Interview	https://ttfuture.org/
J. T. Gatto	How Public Education Cripples Our Kids and Why? (Retrieved on:	Article	SAGEjournals

	18.02.2022)		
J. T. Gatto	Why Schools Don't Educate? (Retrieved on: 25.02.2022)	Article	https://www.naturalchild.org/

Regarding the subject, the author's three originally published books and the Turkish editions of two of these books were examined. Two interviews with the author in English and two articles written by the author were also found. In addition, it has been understood that three criticisms and one article for his book were published in Turkish.

Data Analysis

Document analysis includes accessing documents, checking their authenticity, understanding documents, analyzing and interpreting data. In addition, document analysis includes detailed reading and detailed analysis (Corbin & Strauss, 1998). In document review, "data analysis starts with the selection of the document and access to the document" (Kıral, 2020). As stated earlier, this study is based on a literature review and is therefore categorized as a qualitative research.

In this study, the data obtained were analyzed and presented based on interpretation, as the researcher, due to the nature of the study, was in an epistemological interpretive position (Bryman, 2012, p.30-31) as it aimed to give an academic answer to the question "Can education be seen as a weapon of mass destruction", which is a subjective phenomenon. This method, which was followed in terms of the nature of the subject discussed, was thought to be more suitable for this study. The thoughts of the author (John Taylor Gatto) on the subject were analyzed and evaluated under certain headings. Thus, the findings, criticisms and justifications on the subject are presented in a way that the reader can understand. While analyzing the data of the research, firstly the sources in which Gatto revealed his thoughts were reached. Then these thoughts were defined and classified according to certain categories. It was then interpreted and converted into a report (results and conclusions) based on this classification.

Reliability and Validity of the Research

It is seen that the documents used as data sources in researches are classified in various ways. For example, according to their qualifications; Texts classified as script-based consist of printed sources such as books, encyclopedias, reports, dictionaries, journals, and diaries. Image-based documents are materials such as photographs, posters, maps. Sound-based ones are sound recordings, music broadcasts, radio broadcasts, etc. are resources. There are also audio-visual-based sources, and data sources such as documentaries, TV programs, videos, and movies fall into this group (Kıral, 2020). In this research, text-based documents were used as data sources.

Adding the full names, references and details of the events in the document analysis makes the documents advantageous in the research process (Yin, 2016). It is important for the reliability and validity of the research that this exact information will shed light on further information. This advantageous situation gives the research reliability and validity.

One of the criteria that ensures the reliability and validity of the research in document review is the competence of the researcher. If the researcher can choose the documents examined in accordance with the purpose of the research, determine whether the content of the documents fit the conceptual framework of the study and can determine the originality, accuracy and reliability of the selected documents, the reliability and validity of the research will be ensured to this extent. In order to maximize the reliability and validity of the research, the documents were chosen in accordance with the purpose in this study. The originals of the documents have been reached and the accuracy of the sources has been confirmed at first hand. The impartiality, transparency and credibility of the research has been increased by giving sufficient place to direct quotations.

Findings

The Invalidity of Gatto's Ideas in the Framework of Critical Pedagogy

Education is one of the most discussed and criticized topic in the social and political life. The reason for this is probably that education has an indispensable basic functions accepted in all societies and social institutions. Criticisms made on education are in the direction of continuing education with better qualities and better practices instead of rejecting and exclusion. When we examine Gatto's opinions in his books (2007, 2009; 2017), it is clear that these thoughts do not fall within the scope of critical pedagogy. As it is known, there have been several criticisms and different approaches about the goals, quality and practices of education all over the world. It is normal to talk and discuss issues such as how to provide education, how to ensure effectiveness, and alternative education opportunities. The field of critical pedagogy has emerged as a result of these criticisms and also the use of the economic and political power of education in favor of the advantaged classes of the society. Critical pedagogy is an educational approach created with the thoughts of Paulo Freire (2013), Catherine Baker (2013), Peter McLaren (1995), Ivan Illich (2006) and some others. Critical pedagogy made a worldwide impact in a short time with the criticism it brought to current educational practices. "It can be said that there are two important factors behind the critical pedagogy gaining such an important and meaningful academic ground, political support and social sensitivity in a short time. First, the inadequacy of educational approaches that defend the current status quo; secondly, the advantages of Critical Pedagogy" (İnal, 2018). Based on these determinations, critical pedagogy is not an approach that rejects education and public schooling. It criticizes the system with its existing structure and practices, rather than handling it as unnecessary and even harmful process.

In fact, J.T. Gatto himself states that he is not against education, but against the American education system and school practices there. He takes school and education as separate things. According to Gatto (2009, 61). “schooling is a matter of habit and attitude training. Education is a matter of self-mastery, first; then self-enlargement, even self-transcendence. You can easily compensate for a lack of schooling - the human record is full of stories of those who have done so in the past and those who continue to do so in the present - but without education you will stumble through life, a sitting duck for exploitation and failure, no matter how much money you make”. As can be understood from these statements, Gatto accepts the vital importance of education.

What is criticized and opposed by Gatto is formal public education. Schools are places where formal education is carried out. This is what Gatto opposes. Gatto advocates a form of education that is only informal, that is, there is no regulatory mechanism, and that takes place spontaneously, and he reduces education entirely to this category. This kind of education was practiced when societies did not form complex structures yet, and it was sufficient at that time. Today, this kind of education practices continue only as a complement to formal education. In today's conditions, an incidental, voluntary and even unsystematic education practice as advocated by Gatto is far from meeting the needs of individuals and societies. Every country tries to improve the education system so that the education system achieves its goals. Of course, it is debatable to what extent countries have achieved these goals set by their education systems. Gatto's criticisms on the other hand are largely against schooling and education. He argues that there is no need for education. He completely rejects public schooling and education system. Therefore, it cannot be handled within the framework of critical pedagogy.

The Invalidity of Gatto's Opposition to Compulsory Education Based on Allegations of the Ineffectiveness of Schools

Another criticism by Gatto is the claim that the education given at school is not effective. He expresses the ineffectiveness of the American education system in these words: “We live in a time of great school crisis linked to an even greater social crisis. Our nation ranks at the bottom of nineteen industrial nations in reading, writing, and arithmetic. At the very bottom” (2005, 20). Then he talks about discipline problems in schools and uses the following expressions (Gatto, 2009, 7; 2018, 42):

> Denied access to the ancient catalogue of *ad hoc* disciplinary tactics, classrooms descended into chaos, disorder spiraled out of control-passing into dangerous terrain from what once had been only a realm of petty annoyance. As word passed through student ranks that teachers' hands were tied, crowds of excited kids surged through hallways, howling, screaming, banging on doors, attacking one another.

He only takes the economic function of education and school and expresses that “School trains children to be employees and consumers”. Then he makes the following suggestions (Gatto, 2009, xxiii):

> Teach your own to be leaders and adventurers. School trains children to obey reflexively; teach your own to think critically and independently. Well-schooled kids have a low threshold for boredom; help your own to develop an inner life so that they'll never be bored. Urge them to take on the serious material, the *grown-up* material, in history, literature, philosophy, music, art, economics, theology - all the stuff schoolteachers know well enough to avoid.

He gives some examples of the failure of American education system and tries to prove that why schools do not educate (Gatto, 2022b) and how public education cripples American kids (Gatto, 2022a). These claims then turn out to the criticisms that schools /education make individuals stupid (Gatto, 2005). As an alternative to school education he suggests home schooling saying that “the success of homeschooling shows a different road that has great promise” (Gatto, 2005, 29). Even that education given in a country is not effective, it cannot be concluded that education makes individuals stupid. It cannot be concluded that there is no need for school and education, either. There are international assessment programs to determine the effectiveness of countries' education systems, and there are differences between countries according to these evaluations. However, the fact that the effectiveness of a country's education system is low does not mean that that country does not need an education system or educational institutions.

Actually J.T. Gatto himself states that he does not oppose education, but the school system, rather the school practices in America. Yet, he describes schools as places that cause damage and harm students. He likens education to the weapons of mass destruction. Gatto (2009, 110) claims that “School has no choice but to limit free thought and speech to such a profound degree a gulf is opened between the sanctimonious homilies of pedagogy ('searching for truth; 'leveling the playing field; etc.) and the ugly reality of its practices”. The Australian example he gave to prove what he said is not consistent with them. He claims that “School disconnects, as it was charged to do. It is Caesar's "divide and conquer" strategy brought to peak efficiency. Children are divided from their families, their traditions, their communities, their religions, their natural allies - other children - their interests and on ad infinitum (Gatto, 2009, 130). However, these claims do not reflect the truth and are not compatible with the findings of educational sciences. When we examine the educational goals adopted by developed countries today, it is clearly seen that the aim of the schools is to raise individuals who have a balanced personality in terms of body and emotion, can think freely, can make

rational and scientific decisions, have developed communication skills, know their duties and responsibilities towards their family, environment and society and try to fulfill them.

The Invalidity of the Idea of The Unnecessariness of Education Over the Success Stories of Uneducated People

Another issue that the author emphasizes frequently in his book is the success stories of people who have not received a school education. He gives many examples through real people on this subject. For example, he writes (Gatto, 2009, xv):

> a considerable number of well-known Americans never went through the twelve-year wringer our kids currently go through, and they turned out all right. George Washington, Benjamin Franklin, Thomas Jefferson, Abraham Lincoln? Someone taught them, to be sure, but they were not products of a school system, and not one of them was ever 'graduated" from a secondary school.
>
> the unschooled rose to be admirals, like Farragut; inventors, like Edison; captains of industry, like Carnegie and Rockefeller; writers, like Melville and Twain and Contad; and even scholars, like Margaret Mead.

In every society, it is possible to meet people who have written success stories even though they have left their education in the way the author states in his book. As in many other countries, there are people who have been deprived of even basic education in every country, but who have been successful and famous in different ways in their later life. However, the number of these people is quite small, incomparable with the masses of millions. In other words, the number of such successful people is very limited everywhere and it is too few to generalize. These examples do not lead to the conclusion that public education is unnecessary today.

In another page, Gatto tells the story of the German Phoenix company moving from Germany to China. According to the author, the Germans needed expert teams to do this job, and they made a three-year plan for this. somehow, the Chinese say that they can handle this job in a shorter time, and moreover, with uneducated villagers. The story goes like this (Gatto, 2009, 31-32):

> Not long ago, the ThyssenKrupp Corporation of Germany decided to unload its mighty "Phoenix" steel plant in Dortmund. … The decision was made to sell all 220 acres of buildings to China. … Management expected two payoffs: one in the sales price, and one in the bill to move the plant from Dortmund to near Shanghai. Thyssen Krupp estimated that would take three years and an army of specialists. … China bought Phoenix, but choked on the moving bill. They would do the job themselves. One fine day a raggedy band of a thousand peasants led by peasant Shen Wenrong showed up in Dortmund.

> Here's a capsule of data to help you think about Mr. Shen: He didn't use a computer. He didn't have a real office. He worked from behind something looking suspiciously like a kid's school desk. … In three weeks, his crew built its own dormitories and commissary. Then it broke the steel plant down. Crated it. Shipped it to China. Uncrated it. And set it back up, inside of *one* year, not three. Numerous rules were broken in the process whenever more creative problem-solving seemed appropriate. … If unschooled peasants can demolish and re-erect a steel plant three times faster than professionals, then you and I need to re-examine everything we've been conditioned to accept as truth.

There are many similar examples in Gatto's books and articles. People who are successful in real life, although they have never been educated, are described as examples. Based on these examples, it is concluded that there is no need for school and education. Of course, this is also an important mistake.

The Fact that Compulsory Education is Necessary Now and in The Future

It is seen that there have been significant changes in the basic functions of education from the past to the present. Today, "education is a multifaceted enterprise with scientific, technological, political, psychological, socio-economic and cultural objectives" (Dinçer, 2003, p.105). Society consists of institutional structures with strong functional ties between them. The importance of educational functions listed above cannot be denied in the formation, development and maintenance of ties between social institutions. Education plays a leading role in the production and systematization of scientific knowledge. Technology production is largely based on scientific research and systematic knowledge production. Although there are critical approaches to the political function of education (Tan, 1990; İnal, 1996; Apple, 2006; Althusser, 2019), the protection and development of the political structure adopted by the society can best be achieved through education. Society consists of an order with its institutions and rules. The social function of education comes into play in providing and maintaining this order that society should have. Norms, values, rules and all kinds of cultural elements that ensure social integration are transferred to young generations through education. Likewise, it is possible to train the workforce in the best way necessary to produce the goods and services needed by the society through education. In other words, the human capital required for the economic development of the society can be raised to advanced levels through education.

Today, the success of countries such as Japan, Singapore, South Korea and Taiwan can be given as concrete examples. International student assessment programs such as PISA and TIMMS also confirm it. These countries were among the very backward countries in terms of economy and technology production in the 1960s and 70s. "However, since then they have taken their place among

the few developed economies of the world by determining their education system as a strategic field and developing their human capital" (Şimşek, 2015, 73). Finland, which improves its human capital through education and increases the welfare of its people through economic development, should be included among these countries.

The importance of applying qualified and systematic training programs in the formation of human capital is still valid, and this superior function of education will continue in the near future, as well. The report of the Ministry of Development (Turkey) on the subject includes the following determinations: "Education is one of the most important determinants of the current welfare level of societies and the social and economic mobility between generations. It is known that the quality of education is more effective than the length of stay in education for the development of countries, and global developments rapidly change expectations from education" (Ministry of Development, 2018, p.ix). Educational institutions will also have an important place in the construction of smart societies (Society 5.0) of the near future. "Individuals need to be ready and active for the super-smart society of the future, where artificial intelligence, internet of things, deep learning, big data and human-object-human interactions and communications will be decisive and everything from household appliances to cities will be smart. This is only possible with a dynamic education system integrated with the global world" (Çengel, 2021, p.19).

In addition to all these basic functions, another prominent function of education today is related to the environment. The environmental function of education includes leaving a sustainable living space for future generations by better protecting the environment in which people and all living things live. Rapid production and unconscious use of natural resources, especially with industrialization, have led to some deterioration in the balance of nature today. The world we live on and all living things, depending on it, are faced with risks that are emerging today and may cause bigger problems in the near future. It is also seen as the environmental function of education to create an awareness in all individuals about these problems and to ensure that natural resources are protected more consciously and used rationally. The basis of environmental education is the understanding of protecting nature and natural resources and maintaining a life in harmony with nature. Environmental education should be given to all individuals in educational institutions. Environmental education is important for a sustainable development. According to Dinçer (2003), people of our age should have a skeptical personality who knows how to learn, sees knowledge as a very valuable tool, and accepts that there can be no absolute truth in any sense. He is not content with what is taught and given to him, he is critical, acts like a change agent, is open to innovations and produces new values. Today's societies should consist of tolerant individuals who are interested in politics, equipped with the necessary knowledge and skills in the field in which they will work, with a democratic personality, and who do not treat anyone with prejudice. Today's society should be formed from people who have

learned to think, know how to research, produce and research the right thing while producing, and can add value to their products by using their creativity.

Individuals who are sensitive to natural and social events, who are aware of the fact that their freedom and individuality are very valuable and do not compromise on these, have unlimited imagination, self-respect and self-confidence can be raised through education. As a matter of fact, raising people with these characteristics constitutes the general objectives of the education systems of all countries. All these show that the functions of education continue to increase today and in the future, but the philosophical foundations of education, the quality of education, the way of planning and implementing education, and the approaches of managing the system have changed.

Gatto's Stance against Scientific Studies and Frivolity of his Claims

What reveals that Gatto's thoughts are not based on scientific foundations are his thoughts on scientific studies. Gatto makes fun with the scientific studies on education and pedagogy and the theories developed based on them. He rejects the basic theories accepted by the scientific world, using concepts such as "madness" and "fraud" in a manner that does not comply with scientific ethics.

Gatto's thoughts most deserving of criticism are his thoughts on scientific studies. Science, as a systematic study, includes efforts to reveal events and phenomena through experimentation, observation and research. Scientific studies and the theories developed based on them emerge as a result of long-term and self-sacrificing work with the cooperation of many people. Gatto, on the other hand, almost mocks them and makes fun of them. Regarding pedagogy and psychology, he uses the following expressions (Gatto, 2009, 45):

> When the smoke cleared fifty years later, the imitation sciences of pedagogy and psychology had been imported from northern Germany, pressed into service through the school institution to create a proletariat: family-less, land-less people with only weak ties to religion, tradition, or culture.

From these words of the author, we understand that he does not value pedagogy and psychology at all. He sees the works of Bloom, who has an important place in the field of education, as madness and he makes fun of his studies with the following statements (Gatto, 2009, 4):

> Benjamin Bloom's multi-volume *Taxonomy of Educational Objectives,* an enormous manual of over 1,000 pages out of Blooms Office at the University of Chicago. Later, this work impacted every school in America. Blooms massive effort is the work of a genuine academic madman, constituting, in his own words, "a tool to classify the ways individuals are to act, think and feel as the result of some unit of instruction."

While the author describes the work as 'imposing' and 'huge-dimensional', on the one hand, he makes fun of it and implies that it has negative effects on individuals.

Gatto sees the developmental stages and developmental psychology of the individual, which has an important place in education, as fake and evaluates the studies on these areas as fraudulent (Gatto, 2009, 45):

> To enlist public opinion behind this utopian transformation, a pathological state of youth, heretofore unrecognized by history, was designed by G. Stanley Hall of Johns Hopkins University. He called it *adolescence* and debuted the condition in a huge two-volume study of that name, published in 1904. Trained in Prussia as behavioral psychologist Wilhelm Wundt's first assistant, Hall identified adolescence as a dangerously irrational state of human growth requiring psychological controls inculcated through schooling.

These and other similar expressions are seen more frequently in Gatto's books, articles and interviews. The author's view of education as unnecessary and presenting education as a "weapons of mass instruction" or a process that "dumbing us down" is a situation without any scientific or academic basis. These thoughts have no equivalent in current life. For this reason, this and similar approaches and thoughts should not be valued.

Discussions and Conclusions

What Gatto criticizes and opposes is formal education. Schools are places where formal education is carried out. This is what Gatto opposes and rejects. Gatto commends a form of education that is only informal, that is, there is no regulatory mechanism, and that takes place spontaneously, and reduces education entirely to this category. This kind of educational practice was done when societies did not form complex structures yet, and it was sufficient then. Today, this kind of education practices continue as a complement to formal education. However, in today's conditions, an incidental, voluntary, unsystematic and even incompatible education practice is far from meeting the needs of individuals and societies at our present time. An effective education in today's conditions should be based on a plan and program. Again, the training required by today's conditions can be only given in specially designed environments, schools and by professionally trained experts, teachers and educational leaders.

Education increases human capital and expands employment opportunities. It provides economic productivity, increase in individual and national incomes and contributes to economic growth. The benefits of education to individuals are not limited to these economic values and go far beyond them. Education liberates individuals. Şimşek (2018, p.10) named a book he published as "Only the educated are free" due to the importance of education and he stated that this phrase belongs

to Epictetus, one of the Ancient Greek philosophers. As it is understood, education is seen as a process that develops and liberates individuals from ancient times to the present, and it also includes the education of the mind. From this point of view, education is to develop individuals' correct and rational thinking skills. Besides, education makes people healthier and helps them gain more control over their lives. It leads to the formation of trust between individuals and thus increases social capital. Social capital increases the level of shared welfare at the social level by strengthening institutional structures.

Today, education has become multidimensional and therefore it has become necessary to redefine the organization as a pluralistic and universal phenomenon and to think about it with new paradigms. These developments also significantly affect learning and research activities. It assigns new roles to the school, teacher and students (Uçak and Doğan, 2020). The main reason for these reforms and paradigm shifts in the field of education in the current period are the new situations, the developments at the global level and the need of individuals to have new skills in the face of these new situations. Education is both an individual and a social need as it has a purpose above all social values and institutions in the real sense (Dinçer, 2003, p.110-111).

One of the most basic needs of today's societies is a sustainable economic model, individuals who can respond to the requirements of the age and have employable qualifications. Societies can only meet these basic needs today and in the future with qualified education systems. However, a model based on thinking, researching and questioning should be developed instead of the old paradigm based on transferring information to students in education. Thus, students will be happier by using their imagination, exploring and improving their creativity. Schools and educational institutions will also become more fun, and they will not be boring places as Gatto claims.

It seems important to develop policies in education and to implement the necessary transformations in education with an approach in line with the spirit of the time. As Uçak and Doğan (2020 p.43) emphasized “in a world that is changing, transforming and evolving into a new formation every day; new perspectives required by the century are needed. It is understood that the continuity of education, which is accepted as a long process, is a necessity to rethink education from long-term education policies to daily gains”. Although there are different ideas and approaches towards education, education plays a key role in meeting individual and social needs today and in the future. For this reason, providing easy access to quality education for individuals is among the basic duties of governments. States also take the necessary initiatives to fulfill this duty and constantly strive to have a better education system.

It is necessary to take into account the criticisms of the important names of critical pedagogy on education systems and school practices. However, the conditions in which societies live, the

historical processes they live in, their levels of economic development, and their socio-economic indicators show that school is still an indispensable necessity (Uçak and Doğan, 2020). For this reason, an education paradigm that will meet the needs of today's and future societies should be created and implemented, taking into account the justified criticisms of education systems and school practices. Instead of taking such an approach, Gatto completely rejects public education and schools. However, it does not seem possible to build the smart societies of the future by completely rejecting education and schools.

Critical thoughts arguing that compulsory education is unnecessary can be based on different reasons. It may be justified to some extent to question the quality of education systems for not being effective enough, for not providing equal opportunity etc. Generating well-intentioned and scientifically based ideas about schools can be beneficial for our future in order to create a better social order and minimize inequalities between people. However, it is seen that Gatto's thoughts are not within this scope.

As Cemaloğlu (2018) detects, the aims of some people are not to improve compulsory education, but to realize their own secret aims in an environment where there is no compulsory education, to put the masses to sleep by giving them opium, and to reach their secret goals. These people cannot be expected to produce positive things for our future. The ideas put forward by Gatto in his books (2007, 2009, 2017; also published in Turkish, 2009, 2018) are briefly that public compulsory education and schools are unnecessary. As in the rest of the world, unfortunately, there are people in our country who adopt these ideas and try to spread them. However, the necessity of public compulsory education and schools is an undisputed reality in the historical process and today, and there is a wide literature on this subject (Bourdieu and Passeron, 1990; Becker, 1993; Öztürk, 2001; Heater, 2004; World Bank, 2017; Khattab, 2017; Alwi and Rauf, 2019; Minc, 2019; Gul, Bashir and Mustafa, 2020). For this reason, public education that can meet the needs of the age we live in and comply with scientific principles should be requested, protected and maintained. In order to make the individual improvement and social development power of education more effective, studies that can minimize the inequality of opportunity in education should be given importance. While Gatto opposes schools outright, on the other hand, he tries to put forward alternatives so that educational activities that he cannot deny can be given to all individuals. What he suggests about education is self-education and home schooling, that is, leaving education by itself. However, education is not a subject to be left to its own fate. Equality of opportunity should be provided in education in order to make the power of education more effective for individual and social development. A new educational paradigm that can meet the needs of the individuals and societies of the future should be developed and practiced.

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Written Expression Skills of Both Monoliterate, and Emergent Bilingual Primary School Students: A Comparison with Monolingual Students[1]

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Abstract

Many students learn Turkish as a second language in Turkey. These students, whose first language is Kurdish, learn Turkish at a certain level before starting school. As a result, these students become emergent bilinguals along with school life. On the other hand, some of these students almost do not use Kurdish in their lives and wholly turn to Turkish. Ultimately, all students whose first language is Kurdish continue their education in the same environment with students whose first language is Turkish. As a result, these children lag behind students whose first language is Turkish in many respects. They even lag behind students whose dominant language is Turkish and Kurdish as their first language. This research it is aimed to reveal the differences between the two student groups in the context of written expression skills. The effect of the dominant language difference, preschool education status and socioeconomic level on the written expression skills of primary school students were examined. The research group of 428 primary school fourth-grade students (girl: 201, boy:227) was determined by criterion sampling method. As a result of the research, it was revealed that the written expression skills of the students whose dominant language is Kurdish remained at a deficient level, and they made more spelling mistakes

Keywords: Monoliterate Bilingual, Emergent Bilingual, Primary School Students, Written Expression Skills.

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Introduction

Language is accepted as the most essential and necessary tool in communication and interaction (Abdel-rahman Arman et al., 2015: Farooq et al., 2012). Thanks to language, people can understand each other more easily. As Bachore (2014) states, language is one of the critical concepts of communication and understanding. For this reason, it is essential to master the dominant language. However, sometimes people may not be able to master their language skills sufficiently for various reasons. Especially individuals in acquiring a second language face these problems (Rao, 2019). Individuals trying to acquire a second language can partially speak and understand the second language. However, they may not have immediate reach to the ability to speak the second language at a proficiency level (Ellis, 1997). Therefore, individuals who acquire a second language are likely to encounter difficulties in reading, to speak, listening and writing skills. Sokip (2020) also emphasizes this difficulty in second language learners. Abdel-rahman Arman et al. (2015) attribute these problems in basic language skills to the lack of effective and adequate language teaching. In other words, it is possible to achieve success in the four basic language skills such as reading, writing, listening and speaking with adequate language skills teaching.

Monoliterate Bilinguals

In rural regions of Turkey, such as Eastern and Southeastern Anatolia, many students learn Turkish as a second language before starting school, whose first language is Kurdish (Yılmaz & Şekerci, 2016). Since these students, who are official citizens of Turkey, have different language skills, their proficiency in basic language skills is lower than monolingual students (Asrağ, 2009; Derince, 2012; Uğur, 2017). These students, who have to learn the second language rather than their first language, are literate only in the second language (Turkish). In other words, they are not literate in their first language (Kızıltaş, 2021). Literacy skills are almost non-existent in their first language. This situation is also included in the literature as monoliterate bilingualism (Güzel, 2014; Fishman, 1976).

Although monoliterate bilingual students speak both languages in everyday life, they speak only the second language in school education. They speak their first language again, but this use occurs mainly outside of class/school (Liddicoat, 1991; Musyahda, 2018). On the other hand, according to Fishman (1976), monoliterate bilingual students may have particular proficiency in their speech in both languages. However, since improving literacy skills in the country's official language, rather than in their first language, is a priority, proficiency in the first language may decrease (Ağırman, 2019). Bilingual students in Turkey speak as a second language to Turkish mainly in their schools. In the classroom, they only learn and speak Turkish. This prohibition is that there is no bilingual education in Turkey by the constitution (Turkish Constitution, 1982). In other words, since

they speak Kurdish at home and Turkish in a classroom environment, this also creates problems in acquiring second language skills (Ağırman,, 2019). As a result, monoliterate bilingual students have problems with their second language skills because they speak Kurdish at home and Turkish in the classroom (Ağırman, 2019).

Emergent Bilinguals

Emergent bilingual students continue to speak their first language at home while learning the second language at school (García et al., 2008). Students whose first language in Turkey, especially in rural areas, are Kurdish, also use the first language more intensively at home (Koşan, 2015). In such cases, children in the second language may remain at a lower level (Saydı, 2013) than other first language skills while progressing towards a better level. This negative result occurs because the emergent bilinguals are seen at the same level as monolingual students in the classroom. In the context of ethnicity, dominant language and socioeconomic level, emergent bilinguals, usually composed of heterogeneous and disadvantaged groups (Kong & Hurless, 2021), often do not receive the educational programs they need, according to García et al. (2008). He states that this causes various problems. Indeed, Ortiz et al. (2020) also draws attention to this problem and emphasizes differences between the achievements of emergent bilinguals and monolingual students. López and Santibañez, (2018) also emerged as another source of problems, stating that developing bilingual students also need qualified teachers. Likewise, it should be said that emergent bilingual students are also more unsuccessful in exams based on standardized tests than monolingual students (Hickey, 2016; Kong & Hurless, 2021).

Although emergent bilingual learners use two languages together in their social lives, literacy skills in their first and second languages are low. Language skills also negatively affect academic achievement (Kim, 2019). In other words, emergent bilingual students need language support programs (Menken & Klyen, 2010). Namely, although development is progressing in the second language, it can be said that they are not at the desired level. There are three types of developing bilingual students. These are going to adequate formal schooling, limited formal schooling and long-term emergent bilingual students. The first group have a limited educational background. They are not literate in their first language. The second group can speak both languages. However, they do not have good literacy skills in either language. The third group has superficial reading and writing skills (Freeman, Freeman, Mercuri, 2003; Olsen, 2010). Students whose first language is Kurdish in Turkey can also be evaluated in this context.

Written Expression Skill

It is a well-known fact that emergent bilingual students do not have adequate reading, speaking, understanding and writing skills in Turkish (Yılmaz & Şekerci, 2016; Yiğit, 2009). The

writing and reading skills (Ellis, 1997; Rao, 2019) of bilingual students who acquire a second language other than their first language will be negatively affected by this situation (Alfaqiri, 2018). Moreover, according to Ağırman (2019), the skill bilingual students have the most difficulty with after grammar is written expression. This situation may be due to a lack of proficiency in the second language. According to Göçer (2013), if the student does not acquire good reading and comprehension skills, the student is written expression skills will not be good either. In other words, it states that writing skill is acquired after teaching other language skills. Namely, learning language skills at a proficiency level is also an essential condition.

Written expression skills include a complex and cognitive process. Written expression skill, which seriously affects students' language development and academic success (Hyland, 2003; Safa, 2018), requires the ability to think deeply and analyze a subject by using the individual's prior knowledge (Chakraverty & Gautum, 2000; Eryaman, 2008; Nunan, 1989). That is why written expression skill, unlike speaking skill, needs more support from family. In other words, it is challenging to acquire written expression skills naturally. However, since it has a complex feature that requires the coordination of many cognitive skills and requires support, students accept written expression as a challenging process (Gillespie & Graham, 2014). For this reason, it is an expected possibility to encounter some difficulties in acquiring written expression skills (Anvar & Ahmed, 2016; Aronoff & Rees-Miller, 2007).

According to Brisk (2011), especially students who acquire a second language face some difficulties acquiring and developing their written expression skills. Written expression skill is challenging as it requires much knowledge such as vocabulary, grammar and rules (Negari, 2012). In addition, Brisk (2011) draws attention to the fact that as children who acquire a second language develop their written expression skills, they have more command of the language. He states that students begin to have power over the second language with this proficiency. Husna et al. (2013) also draw attention to the difficulties experienced by second language learners, especially in written expression skills. The problems experienced by second language learners are listed as insufficient vocabulary knowledge, not knowing the meanings of words sufficiently, not being able to organize paragraphs. According to Alfaqiri (2018), there is a fundamental reason for this: Acquiring a language becomes a burden as students see second language acquisition as a goal they must conquer. Thus, they face severe difficulties, especially in their written expression skills. On the other hand, it can be stated that the different language structures cause these problems. In other words, it can be a problem if the first language does not provide the desired contribution to the second language. The lack of concrete data showing that the first language contributes to the written expression skills of bilingual students in Turkey and the similarity of this situation in other countries (McCarthey et al., 2005) is proof in this regard. Likewise, the fact that emergent bilinguals do not meet the second language in a formal sense

is an obstacle to developing written expression skills. Especially not having preschool education negatively affects the language skills of bilingual students (Susar Kırmızı et al., 2016; Kıvrak, 2019; Koşan, 2015). Similarly, the low socioeconomic level is also a negative factor affecting the written expression skills of second language learners (Doğan, 2017). To summarize, monoliterate and emergent bilinguals students in Turkey have problems with their written expression skills. Language differences, lack of preschool education and socioeconomic level are also essential factors at the root of the problem.

It is important not to see written expression only as a judgment and evaluation tool and overcome the difficulties encountered in written expression skills. Teachers have a significant role in teaching written expression skills. First, the teacher should help students acquire good writing skills (Rao, 2019). Therefore, teachers should emphasize improving students' written expression skills because written expression skill is not an innate skill that cannot be changed or developed (Nasir et al., 2013). Therefore, misconceptions about written expression skills should be avoided. Otherwise, the development of written expression skills is prevented, and its importance is pushed into the background. In other words, the importance of written expression skills should be given priority in the first stages of second language teaching (Al-Gharabally, 2015: Fareed et al., 2016). Teachers should take responsibility in this context.

When the literature is examined, it is noteworthy that the studies examining the written expression skills of students who acquire Turkish as a second language are limited. These studies were mostly limited to secondary school students (Ağırman, 2019; Doğan, 2017; Kıvrak, 2019; Özdemir, 2016). Therefore, no comprehensive research was found on emergent bilingual primary school students in rural areas of Turkey. Düzen (2017) also draws attention to this limitation. On the other hand, in the literature outside of Turkey, it can be said that there are a significant number of studies to determine the written expression skills of second language learners and the problems they experience (Anvar & Ahmed, 2016; Alfaqiri, 2018; Farooq et al., 2012; Fareed et al., 2016: Rao, 2019). The lack of studies in this context in Turkey, especially in bilingual primary school students, is a fact. This study is of great importance to fill the gap in this area. Comparing the written expression skills of bilingual primary school students and monolingual students makes the study even more original and meaningful. The research assumes that students whose first language is Turkish have lower written expression skills than students whose first language is Kurdish. Among the bilingual students in Turkey, some students almost forget their first language (Kurdish) and rarely use this language. Therefore, it is essential to identify some students in this context who are almost at the same level as monolingual students. For this reason, the dominant language of all student groups was determined in the research. In the context of the importance and aims of the research, answers to the following questions were sought:

1. Do bilingual and monolingual students' typos, correct and total word levels, and written expression skills differ significantly according to the dominant language?
2. Do bilingual and monolingual students' typos, spelling errors, correct and total word levels, and written expression skills differ significantly according to their preschool education status?
3. Do bilingual and monolingual students' typos, spelling errors, correct and total word levels, and written expression skills differ significantly according to socioeconomic level?

Method

Research Design

The quantitative research method was used in this study. Quantitative research offers the opportunity to perform analysis and quantification to get results related to various variables from the collected data. This context includes using specific statistical techniques and analyzing numerical data to answer various questions (Apuke, 2017). Quantitative research methods are divided into surveys, correlational, experimental and causal-comparative research, according to Sukamolson (2017). In this study, the 'survey model' was used within the scope of quantitative research methods. The survey model is a model that requires the use of statistical methods by measuring the characteristics of a particular population selected through a designed measurement such as a survey (Sukamolson, 2017). In this study, the scanning model was used because it was aimed to determine the effects of some variables on the written expression skills of primary school students whose first language was different from their second language.

The Study Group

The study group of this research consists of fourth-grade primary school students studying in a city located in the eastern part of Turkey. The research sample was selected by criterion sampling method, one of the purposeful sampling methods. In the criterion sample, it is essential to determine the participants with a predetermined set of criteria (Yıldırım & Şimşek, 2006). The criteria determined in selecting the sample of this study; are bilingual and monolingual primary school students who study in the same schools. In addition, being a fourth-grader is also a criterion. Because the last grade level of primary school in Turkey is the fourth grade. Therefore, students who have reached this grade level are expected to have good language skills. Descriptive statistics of the study group are given in Table 1.

Table 1. Descriptive Statistics of Fourth-Grade Students with Different Dominant Languages Participating in the Research.

Variables	Answer	f	%
Dominant language	Turkish	170	39.7
	Kurdish	258	60.3
Gender	Girl	201	47.0
	Boy	227	53.0
Pre-school education status	Yes	246	57.5
	No	182	42.5
Socioeconomic level	Low	204	47.7
	Average	118	27.6
	High	106	24.8

It is seen that the dominant language of 39.7% of the primary school students who participated in the research is Turkish, and the dominant language of 60.3% of them is Kurdish. 53% of the students are boys, and 47% are girls. 57.5% of students whose dominant language is further received preschool education. 47.7% of the students, that is, most of them, are in the lower socioeconomic level.

Data Collection Tools

Data collection tools developed to measure written expression skills of primary school students whose dominant language is different are listed below.

Student Information Form: There are 11 questions in the student information form. These questions are the gender of the students, the education level of the parents of the student, the income of the family, the profession of the parents of the students, the status of receiving preschool education, the language most used in the family (Turkish, Kurdish), whether the mother and the student know Kurdish. In addition, the first language learned from the mother (Turkish, Kurdish).

Written Epression Skills Scale: The 'Story Writing Evaluation Form' developed by Doğan and Müldür (2014) was used. This form consists of 17 items: margins, paragraphs and lines, outline, title, heroes, place, time, plot, problem, solution, main idea, word, sentence, coherence, paragraph, spelling and punctuation. The criteria in the form prepared as a rubric were scored between 1 and 4. Therefore, scoring is as follows: unsatisfactory (1), acceptable (2), sufficient (3), very good (4).

Typos Identification Form: Criteria such as 'letter skipping, reverse writing, letter mixing, compound writing, syllable writing, word addition, misspelling, spelling errors' were considered. Typos determined for grades 1-5 in primary school by Erden et al. (2002) were also taken as a reference in evaluating written expression skills.

Data Collection Process

In order to measure written expression skills, five topics were determined following the themes in the primary school fourth-grade textbook. Students were asked to write an accessible story about one of these topics. These issues were determined as 'healthy individual, environmental pollution, our responsibilities in the family, conscious consumerism and protecting animals'. The students were given about 40 minutes, which is one class hour. Classroom teachers carried out the activity. Hyland (2003) emphasizes that freewriting allows students to express their thoughts freely and develops their creativity. Freely written stories were evaluated with an assessment scale of written expression skills. The Cronbach's alpha coefficient calculated for the story writing evaluation scale was 0.81. According to Kalaycı (2018), in this case, the scale is highly reliable ($0.80 \leq \alpha < 1.00$). The data collection process took approximately one week.

Data Analysis

The data collected at the research end were analyzed with the SPSS 25.00 package program. In the context of these data, the t-test was used to compare the means of the two groups and determine whether there was a significant difference between them. A one-way analysis of variance (ANOVA) was used to compare more than two groups. A significance level of 0.05 was taken as a criterion in all analyses. In scoring students' written expression skills, the sum of the scores in 17 questions in the written expression skills scale was considered. The number of all words in the free story written by the students was determined as 'total word levels'. 'Correct word levels' were determined by subtracting typos (letter skipping, reverse writing, letter mixing, compound writing, syllable writing, word addition, misspelling, spelling errors, etc.) from the total number of words written.

In the research, two-step cluster analysis was applied by using SPSS 25.00 program to determine the dominant language of primary school fourth-grade students whose first language was different. With this analysis, the homogeneity of the clusters within themselves and the heterogeneity between clusters is very high (Kalaycı, 2018). In this context, as seen in Figure 2, some questions were asked to the students about using the first language. As a result of the questions, the students were divided into two groups as the students whose dominant language was Turkish or Kurdish. They are primarily emergent bilingual students whose dominant language is Kurdish. Because these students receive their education in the second language, Turkish, not Kurdish, they also become bilingual over time.

Table 2. Results of Two-Step Cluster Analysis for the Dominant Language

Variables	Cluster 1 (Kurdish)	Cluster2 (Turkish)
Kurdish language proficiency	Yes (%93)	No (%100)
The most spoken language in the family	Kurdish(%73,6)	Turkish (%100)
The first language learned from mother	Kurdish (%64,7)	Turkish (%100)
Mother's Kurdish language proficiency	Yes (%96,1)	No (%54,7)
N* (428)	258	170

N: Total number of individuals in clusters

In the two-step clustering analysis conducted within the scope of the research, the silhouette coefficient was taken as the basis when deciding on the number of clusters. Silhouette coefficient takes values between -1 and +1. As this coefficient gets closer to the value of +1, the difference between clusters is minimum, and the difference between clusters is maximum. If this coefficient is 0, it means that the clusters are very close to each other and that the cluster elements are not different; that is, there is no clustering. Negative values indicate that individuals are placed in the wrong clusters (Rousseeuw, 1987). In the context of this research, the silhouette coefficient was obtained as 0.60. This value indicates a good level of differentiation between clusters and similarity within clusters. The findings of the AIC and BIC values used in deciding the number of clusters are given in Figure 1.

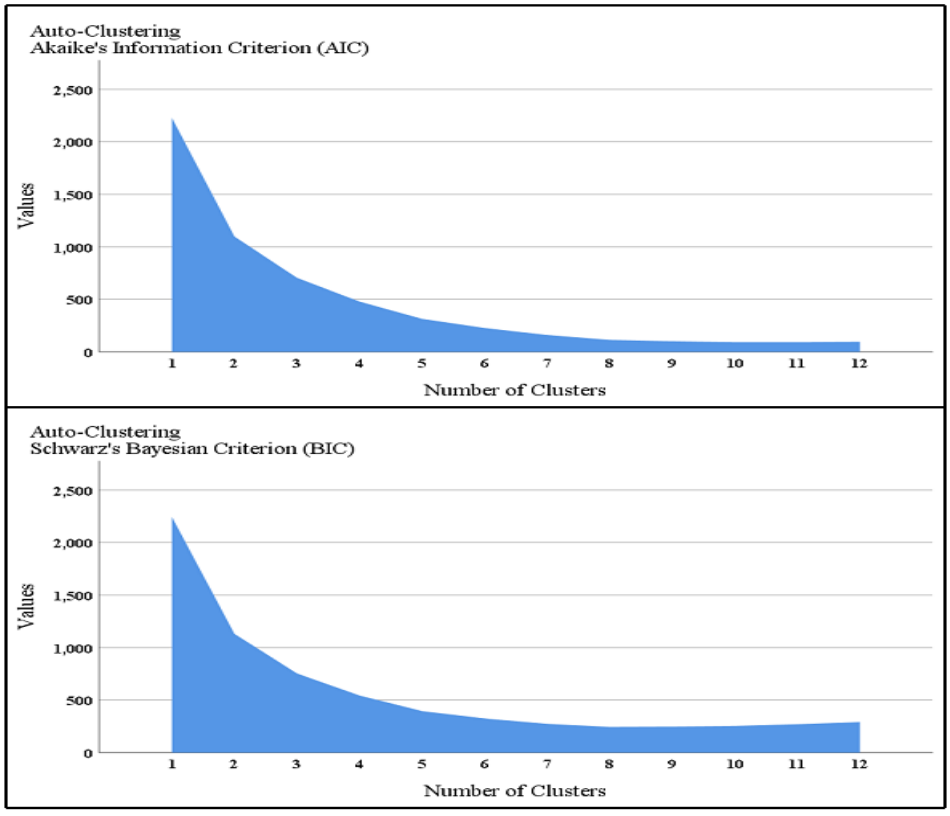

Figure 1. Change in BIC and AIC Values of 12 Clusters Obtained in the Study

Both AIC and BIC showed the most break in the second cluster. In other words, the values of the 2 clusters are generally close to each other, and the decrease in these values gradually decreases. These findings indicate that the data fit both clusters well.

Similarly, two-step cluster analysis was used in the study to determine the socioeconomic levels (SEL) of primary school fourth-grade students whose first language was different. Five questions were asked to the students in this context. According to the findings obtained as a result of the questions, students were generally divided into three clusters in terms of socioeconomic level. The defining features of the clusters are given in Table 3.

Table 3. Results of Two-Step Cluster Analysis for Socioeconomic Level

Variables	Cluster 1 (upper)	Cluster 2 (average)	Cluster 3 (lower)
Family monthly income	3000 TL-More (%92)	1000-3000 TL (%100)	1000-3000 TL (%93)
Mother's education level	Bachelor's degree/ higher (%56.6)	Primary education (%73)	Primary education (%99.5)
Father's education level	Bachelor's degree/ higher (%75.5)	High school (%60.2)	Primary education (%100)
Mother's profession	Public official (%40.6)	Self-employment (%100)	Self-employment (%100)
Father's profession	Public official (%78.3)	Self-employment (%61)	Self-employment (%100)
N* (428)	106	118	204

N: Total number of individuals in clusters.

There are 106 students in the first cluster (upper socioeconomic level), 118 in the second cluster (average socioeconomic level), and 204 students in the third cluster (lower socioeconomic level). As a result of the two-step clustering analysis, the silhouette coefficient was 0.60. This value indicates a good level of differentiation between clusters and similarity within clusters. Findings of AIC and BIC values used in deciding the number of clusters are given below.

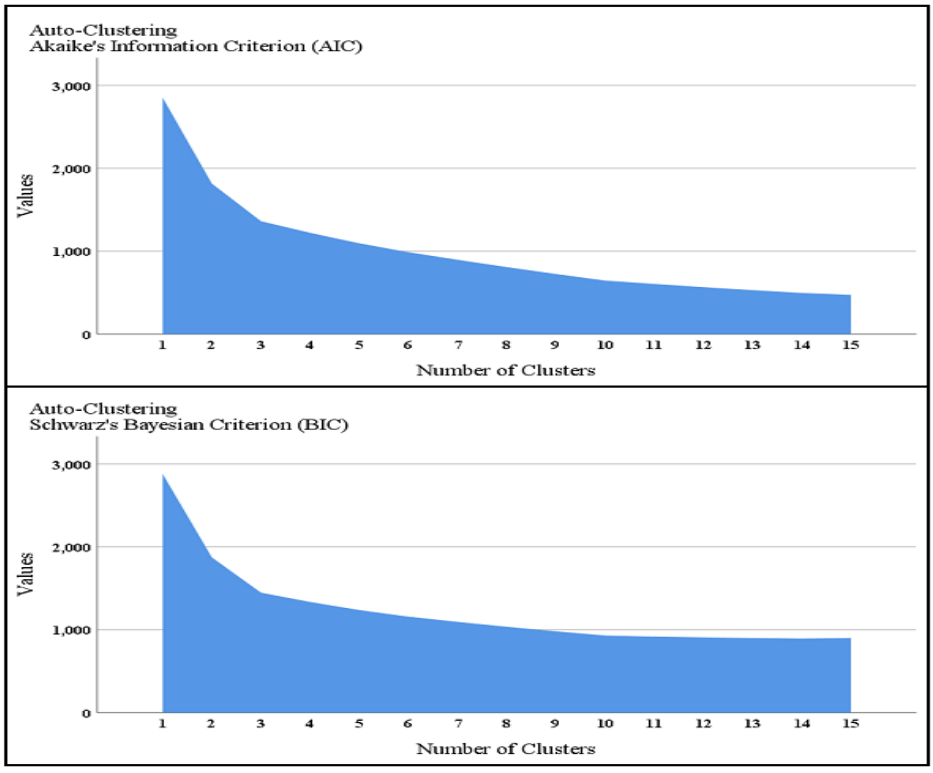

Figure 2. Change in BIC and AIC Values of 15 Clusters Obtained in the Study.

Both AIC and BIC gave the breaking value in the third cluster the most. In other words, the values above 3 clusters are generally close to each other, and the decrease in these values gradually decreased. These findings indicate that the data fit well in all three clusters.

Results

In this section, the findings related to the sub-problems are presented. Table 4 shows the values of typos (spelling and word errors), correct and total word levels, written expression skills scores on the arithmetic mean, standard deviation and independent T-Test, according to the dominant language variable of primary school fourth-grade students whose first language is different.

Table 4. T-Test Results of Typos, Correct, and Total Word Levels, Written Expression Skills Scores of Primary School Fourth Grade Students with Different First Language According to the Dominant Language Variable.

Variables	Dominant language	n	x̄	Ss	Sd	t	p
Typos	Turkish	170	23.61	20.13	426	-6.723	000*
	Kurdish	258	41.55	30.68			
Correct word level	Turkish	170	96.47	41.59	426	5.745	000*
	Kurdish	258	72.74	41.96			
Total word level	Turkish	170	109.0	40.49	426	3.133	002*
	Kurdish	258	96.67	39.65			
Written expression skill	Turkish	170	32.23	10.49	426	9.040	000*
	Kurdish	258	26.55	11.05			

***** p<.05

Typos of primary school fourth grade students whose dominant language is different ($t_{(426)}$=-6.723; p<.05); correct word levels ($t_{(426)}$=5.745; p<.05); There was a significant difference in total word levels ($t_{(426)}$=3.133; p<.05) and written expression skill scores ($t_{(426)}$=9.040; p<.05). All the differences favour the students whose dominant language is Turkish.

Table 5 shows the typos (spelling and word errors), correct and total word levels, arithmetic mean, standard deviation and independent T-Test of written expression skills scores of primary school fourth-grade students whose dominant language is Turkish according to the variable of receiving preschool education.

Table 5. T-Test Results of Typos, Correct, and Total Word Levels, Written Expression Skills Scores of Primary School Fourth Grade Students Whose Dominant Language is Turkish According to the Variable of Receiving Preschool Education.

Variable	Preschool education	n	x̄	Ss	Sd	t	p
Typos	Yes	134	23.42	20.36	168	-.240	811
	No	36	24.33	19.50			
Correct word level	Yes	134	98.00	42.49	168	.925	356
	No	36	90.77	38.07			
Total word level	Yes	134	110.4	41.98	168	.874	383
	No	36	103.8	34.40			

Written expression skill	Yes	134	37.00	10.95	168	1.847	067
	No	36	33.38	8.025			

***** p>.05

Typos of primary school fourth grade students whose dominant language is Turkish ($t_{(168)}$=-.240; p>.05); correct word levels ($t_{(168)}$=.925; p>05); It was found that there was no significant difference in total word levels ($t_{(168)}$=874; p>.05) and written expression skill scores ($t_{(168)}$=1.847; p>.05).

Table 6 shows the values of typos (spelling and word errors), correct and total word levels, arithmetic mean, standard deviation and independent T-Test of written expression skills scores of primary school fourth-grade students whose dominant language is Kurdish, according to the variable of receiving preschool education.

Table 6. T-Test Results of Typos, Correct, and Total Word Levels, Written Expression Skills Scores of Primary School Fourth Grade Students Whose Dominant Language is Kurdish According to the Variable of Receiving Preschool Education.

Variable	Preschool education	n	x̄	Ss	Sd	t	p
Typos	Yes	112	36.24	25.85	256	-2.458	.015*
	No	146	45.62	33.45			
Correct word level	Yes	112	76.64	40.61	256	1.309	192
	No	146	69.75	42.86			
Total word level	Yes	112	97.16	39.38	256	.177	860
	No	146	96.28	39.98			
Written expression skill	Yes	112	28.75	12.55	256	.400	005*
	No	146	24.86	9.459			

***** p>.05

Correct word levels of primary school fourth-grade students whose dominant language is Kurdish ($t_{(256)}$=1.309; p>05); It is seen that there are no significant differences in total word levels ($t_{(256)}$=.177; p>.05) scores. It is possible to interpret these findings as that preschool education does not affect the correct-total word-level scores of students whose dominant language is Kurdish. On the other hand, there was a significant difference in typos ($t_{(256)}$=-2.458; p<.05) and written expression skill scores of primary school fourth-grade students whose dominant language is Kurdish. ($t_{(256)}$=.400; p<.05). According to this finding, it favours students whose dominant language is Kurdish who receive preschool education.

Table 7 shows the values of typos (spelling and word errors), correct and total word levels, arithmetic mean, standard deviation and ANOVA of written expression skills scores of primary school fourth-grade students whose dominant language is Turkish, according to the socioeconomic level variable.

Table 7. ANOVA Results of Typos, Correct, and Total Word Levels, Written Expression Skills Scores of Primary School Fourth Grade Students Whose Dominant Language is Turkish According to the Variable of Socioeconomic Level

Variables	SEL	n	x̄	Ss	SOS	df	AOS	F	p	D
Typos	Low	78	20.39	16.73	2000	2	1000	2.512	.084	
	Average	59	24.59	20.30	6651	167	398			
	High	33	29.48	25.64						
Correct word level	Low	78	103.4	41.15	1098	2	5493	3.260	.041*	H-A
	Average	59	85.66	36.98	2814	167	1685			
	High	33	99.24	47.33						
Total word level	Low	78	114.1	42.24	7069	2	3534	2.186	.116	
	Average	59	100.2	34.60	2700	167	1616			
	High	33	112.6	44.41						
Written expression skills	Low	78	40.34	10.22	2472	2	1236	12.79	000*	H-A
	Average	59	33.22	9.838	1612	167	96.57			H-L
	High	33	31.90	8.765						

According to the socioeconomic level variable of primary school fourth-grade students dominant language is Turkish, the difference in typos (F =2.512; p>.05) and total word levels (F =2.186; p>.05) scores was not significant. On the other hand, the difference in correct word level (F =3.260; p<.05) and written expression skills scores were statistically significant (F =12.79; p<.05). After testing that the variances were not homogeneous, Tukey's multiple comparison technique, one of the post-hoc techniques, was applied to determine which group the difference originated from. There was a difference between the upper-level and intermediate-level students in the correct word levels of the students whose dominant language is Turkish. Likewise, there were significant differences in written expression skills between high-level students and intermediate and low-level students. These differences are in favour of high-level students.

Table 8 shows the values of typos (spelling and word errors), correct and total word levels, arithmetic mean, standard deviation and ANOVA of written expression skills scores of primary school fourth-grade students whose dominant language is Kurdish, according to the socioeconomic level variable.

Table 8. ANOVA Results of Typos, Correct, and Total Word Levels, Written Expression Skills Scores of Primary School Fourth Grade Students Whose Dominant Language is Kurdish According to the Variable of Socioeconomic Level

Variable	SEL	n	x̄	Ss	SOS	df	AOS	F	p	D
Typos	Low	28	30.57	28.10	4700	2	2350	2.525	.082	
	Average	59	39.49	32.95	2373	255	930			
	High	171	44.05	30.00						
Correct word level	Low	28	97.53	44.70	1946	2	9730	5.729	.004*	H-A
	Average	59	68.32	37.93	4330	255	1698			H-L
	High	171	70.21	41.70						
Total word level	Low	28	116.5	43.00	1285	2	6426	4.188	.016*	H-A

	Average	59	91.84	36.59	3912	255	1534			H-L
	High	171	95.08	39.38						
Written expression skill	Low	28	34.64	9.145	2087	2	1043	9.072	000*	H-A
	Average	59	24.91	9.344	2933	255	115.0			H-L
	High	171	25.80	11.37						

* p<.05 H: High, A: Average, L: Low, SOS: Sum of Squares, AOS: Average of Squares, D: Difference

According to the socioeconomic level variable of primary school fourth-grade students whose dominant language is Kurdish, there was no significant difference in typos (F =2.525; p>.05). On the other hand, correct word level (F =5.729; p<.05); The difference in total vocabulary level (F =4.188; p<.05) and written expression skills scores were statistically significant (F =9.072; p<.05). There was a significant difference in the correct and total word levels, written expression skills of the students whose dominant language is Kurdish in favour of the students in the upper socioeconomic level.

Discussion, Conclusion and Recommendations

Significant differences were found between the written expression skills of primary school fourth-grade students whose dominant language was different. There are various reasons behind these differences. In this part of the study, the effect of these reasons was questioned. Those whose dominant language is Kurdish are emergent bilingual learners. The language of instruction for these students is only Turkish. Even if Kurdish is dominant, students become bilingual because the education is in Turkish. Bilingualism is in the process of development.

It has been concluded that there are significant differences between the typos, correct and total word levels and written expression skills scores of the students whose dominant language is different. The scores for written expression skills of students whose dominant language is Turkish, monolingual, are at a higher level. This finding is consistent with various studies conducted in Turkey (Kan & Hatay, 2017: Özdemir, 2016; Sarı, 2001; Sugiharto, 2015). Likewise, Ng (2015) emphasizes that monolingual students have better-written expression skills than bilingual students. Similar results are found in the research conducted by Kan and Yeşiloğlu (2017). Farooq et al. (2012) also concluded in their research that the written expression skills of bilingual students develop in a challenging way. They emphasize that this difficulty creates a disadvantage. This disadvantage is mainly attributed to the structural and cultural differences in written languages. According to Cai (2004), these differences also lead to different problems. The problems are concentrated in grammar, writing appropriate compositions, and appropriately presenting their thoughts. According to Safa (2018), a written expression often becomes scary for individuals who acquire a second language due to these problems. It should also be noted that different research results draw attention to the disadvantages and difficulties experienced by second language learners in written expression skills (Ahmed Suliman, 2014; Hussein & Mohammad, 2011; Jun 2008). On the other hand, Poorebrahim et al. (2017) state

that bilingual students use more metacognitive skills than monolingual students, which positively affects their composition writing and written expression. Findings related to the better-written expression skills of students who acquire a second language are also included in other research results (Gort, 2006). Apart from this, according to Ng (2015), although being bilingual provides an advantage in writing skills, there is no clear and satisfactory data or study about this situation. On the other hand, there are also studies stating that there is no difference between the written expression skills of bilingual students and monolingual students. According to the results of his research, Ng (2013, 2020) states that there is no significant difference between the written expression skills of bilingual and monolingual students. Likewise, the research conducted by Droop and Verhoeven (2003) studying the written expression skills of bilingual and monolingual students supports this situation.

It has been concluded that there is no effect of preschool education on typos, correct and total word levels and written expression skills of monolingual primary school students whose dominant language is Turkish. In other words, taking preschool education or not does not affect the written expression skills of Turkish-speaking monolingual students. Likewise, students whose dominant language is Turkish have an excellent level of Turkish proficiency before they come to school may be effective because Turkish is already spoken in the students' homes and the neighbourhood. Yazıcı (1999) also states that having specific proficiency in the dominant language before starting school contributes to writing. More importantly, students in this group are exposed to the Turkish language to a great extent before they start school life. This situation is effective in language proficiency. Contrary to the result of this research, a significant number of studies have concluded that taking preschool education has a positive effect on written expression skills. Based on their research, Tavşanlı and Bulunuz (2017) state that preschool education positively affects the development of written expression skills. Similarly, Erdoğan (2011) draws attention to the positive relationship between preschool education and written expression skills in monolingual students. It should be noted that other studies draw attention to the effect of preschool education and going through this education process on students' written expression skills (Catts et al., 2012; Coşkun, 2006, 2010; Crone & Whitehurst, 1999; Cunningham & Stanovich, 1997; Farver et al. al., 2007; Kartal et al., 2016). According to Çetin et al. (2018), emphasizing that especially phonological awareness of preschool students is related to written expression skills, this relationship positively affects written expression skills in later ages. Undoubtedly, these results draw attention to the role of preschool education on primary school students' written expression skills. In addition, Yılmaz (2012) states that preschool education is a source for written expression skills. The child's scribbling at home before starting school, observing the writing work of his sibling who goes to school, drawing pictures and drawings form the basis for him to develop a thorough understanding of writing. This pre-knowledge he gained will benefit his writing studies when he starts school.

It has been concluded that preschool education does not affect bilingual students' correct and total word levels whose dominant language is Kurdish. It is pretty remarkable not to come across research findings in the literature stating that preschool education does not affect the written expression skills of bilingual students. On the other hand, the other findings obtained as a result of the research show that the variable of receiving preschool education effectively affects the spelling mistakes and written expression skills of bilingual students. In other words, it should be said that emergent bilinguals students who receive preschool education make fewer spelling mistakes and their written expression skills are generally better. This result is consistent with various research results in the literature (Susar Kırmızı et al., 2019; Kıvrak, 2019; Topcu, 2012). Similarly, in the study conducted by Kan and Hatay (2017), there is a conclusion that the reading and writing skills of bilingual students who receive preschool education are better than those of bilingual students who have not received preschool education. Similarly, in the study conducted by Kan and Hatay (2017), there is a conclusion that the reading and writing skills of bilingual students who receive preschool education are better than those of bilingual students who have not received this education. Koşan (2015) also states that bilingual students who receive preschool education in Turkey are successful in reading and writing. Therefore, Koşan states that going through preschool education also effectively ensures school readiness. Restrepo and Harmon (2008) also state that the education and writing activities during preschool education contribute to bilingual students' written expression skills later on. In Doğan's (2017) study on bilingual students (Turkish-Arabic) studying in Turkey, it was concluded that bilingual students who received preschool education had better written expression skills than students who did not receive this education. Other studies reveal the effect of preschool education on the written expression skills of bilingual students (Çabuk et al., 2018; Susar Kırmızı et al., 2016).

It has been concluded that the variable socioeconomic influences the typos, correct word levels and written expression skills of the monolingual students whose dominant language is Turkish. In other words, the better the socioeconomic levels of the students, the better their written expression skills. This finding also overlaps with some research results (Çelik, 2012; Deniz, 2003; Dölek & Hamzadayı, 2018; Haykır, 2012; Tabak & Topuzkanamış, 2014; Yılmaz, 2011). Similarly, Bartscher et al. (2001) also emphasize that low socioeconomic level causes a low level of written expression skills according to the results of their research. Chokwe (2013) draws attention to the fact that socioeconomic level is very effective, especially on writing skills, which is also harmful. When the results of various studies are examined, it is seen that socioeconomic level affects written expression skills (Arıcı & Ungan, 2008; Sholikah et al., 2019). In addition, Temel and Katrancı (2019) state that the socioeconomic level of the region where the school is located affects the students' ability to write

narrative and informative texts. On the other hand, there should be mentioned that studies conclude that socioeconomic level does not affect students' written expression skills (Pettigrew, 2009).

It was concluded that the socioeconomic variable affected the correct and total word levels and written expression skills of monoliterate and emergent bilinguals students. In other words, bilingual students with good socioeconomic levels have good written expression skills. This result is consistent with various research results (Deniz, 2003; Doğan, 2017). Likewise, according to the research conducted by Van Rensberg and Lamberti (2013), the written expression skills of students with low socioeconomic levels who continue their education in rural areas remain at a lower level. Salameh (2012) also attributes second language learners' low written expression performance to the low socioeconomic level. Chokwe (2013) also states that the academic writing skills of students who acquire a second language and have a low socioeconomic level are adversely affected by these disadvantages. On the other hand, Babayiğit (2014) draws attention to a fundamental issue in his research. He points out that studies examining the written expression skills of bilingual and monolingual students at the socioeconomic level are pretty limited, even in England. Moreover, he emphasizes that there is a need to examine the effect of socioeconomic variables on the writing skills of second language learners. It can be said that similar limitations exist in Turkey.

Recommendations and Limitations

Preschool education should be compulsory, as it is foreseen that it will contribute to the development of written expression skills of emergent bilinguals. In order to reduce the negative impact of bilingual students' socioeconomic disadvantages on their written expression skills, students in these regions should be provided with original teaching materials. Supporting bilingual students to improve their Turkish skills outside of school can make their education at school more meaningful. For this purpose, projects can be developed to make parents a part of the language teaching process. Additional textbooks can be prepared to improve the Turkish skills of bilingual students. It may be suggested that researchers investigate and compare the academic achievement and reading comprehension levels of emergent bilinguals with those whose dominant language is Turkish. The research is limited to students whose dominant language is different and their primary school level. At the same time, the data were selected from only one province. This is another limitation.

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Determining Secondary School Students' Knowledge Levels on Ecosystem, Biodiversity, and Environmental Problems

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Abstract

The present study aimed to determine the knowledge levels secondary school students have on ecosystem, biodiversity, and environmental problems within the context of a science class and to identify the relationship between their knowledge levels on these subjects according to gender and science course grades. The study applied the survey design, a quantitative research method. The participants for the study included 400 eighth-grade students from a public secondary school in Ankara, Turkey during the 2018–2019 academic year. The Ecosystem, Biodiversity, and Environmental Problems Achievement Test (EBET) was used to collect the study data, and SPPS 17 software was used for data analysis. The students' responses to EBET were evaluated based on Bloom's Original taxonomy. The results revealed that the students had no difficulty in answering knowledge and comprehension questions, partial difficulty in answering application questions, and great difficulty in answering analysis questions. There was a positive, moderately significant relationship between the students' science course grades and their scores on the knowledge and comprehension questions; however, no significant relationship was found between their science course grades and their scores on application and analysis questions. Regression analysis was performed to determine the predictive value of science course grades on the knowledge levels of ecosystem, biodiversity and environmental problems. The students' knowledge and comprehension scores varied significantly by gender in favor of the female students, whereas their application and analysis scores did not vary significantly by gender.

Keywords: Ecosystem, biodiversity, environmental problems, Bloom's taxonomy, secondary school students

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Introduction

Environmental problems pose one of the greatest challenges faced by today's world. The main reasons behind the emergence of environmental problems are people's unconscious behavior, negative attitudes and ignorance towards the environment. In order to protect the environment, emphasis has been placed on developing and/or improving value judgements concerning natural assets and habitats, and their sustainability in human-environment and human-nature relationships (Özkan, 2008). The many disciplines that address the natural environment, including biology, chemistry, geography, and economics, has resulted in the emergence of a wide range of approaches to environmental education. In some cases, environmental education is delivered as a separate course, while in others it is delivered as part of a course, like biology or geography, or designed as a separate theme and interspersed among different courses. Environmental education at the secondary education level in Turkey is delivered in different courses, like science, life sciences, and social sciences. The concepts of ecosystem, biodiversity, and environmental problems cannot be considered as separate from one another, as changes in one affect the others. These concepts should therefore not be evaluated through a human-based perspective alone but rather, by considering all the elements that form an ecosystem. With this in mind, the present study addresses ecosystem, biodiversity, and environmental problems together. A limited number of the studies in the related literature have reported that students have a moderate level of knowledge regarding environmental concepts and environmental problems (e.g., Yurttaş & Sülün, 2010). A far greater number of studies, on the other hand, have found that students have an insufficient level of knowledge on these subjects (e.g., Atasoy & Ertürk, 2008; Erduran Avcı & Darçın, 2009; Karakaş, Doğan & Sarıkaya, 2016; Gökdere, 2005; Morrone, Mancl & Carr 2001; Uluçınar et al., 2008). Students' participation in environmental actions, their awareness of environmental problems, and their suggestions for the elimination of these problems have also been reported to be insufficient (Uluçınar et al., 2008).

It is important to carry out alternative assessment and evaluation methods to identify the cognitive levels that individuals have for any given topic, including environmental issues (Öksüz & Güven-Demir, 2019; Samaie & Khosravian, 2014). In the study by Leeming, Dwyer, and Brecken (1995), secondary school student's Environmental Attitude and Knowledge Scale (CHEAKS) was developed and applied. There are many studies in the related literature involving the development of achievement tests in multiple-choice formats (e.g., Aydın & Selvi, 2020; Akbulut & Çepni, 2013; Dumanoğlu & Akçay, 2018; Güneş & Serdaroğlu, 2018; Keçeci, et al., 2019; Nacaroğlu et al., 2020; Özcan et al., 2019; Özkan & Eryılmaz Muştu, 2018; Saraç, 2018; Sontay & Karamustafaoğlu, 2017; Sontay & Karamustafaoğlu, 2020; Şener & Taş, 2017; Türkoğlu & Uzunkoca, 2017).

In a comparison of the 2005 and 2013 science curricula in terms of environmental issues, it was found that there were only minor changes, like redistribution of environmental topics according

to grade level and changes in the allotted time for these topics, in the environmental issues addressed in the 2013 science curriculum. According to the Ministry of National Education (MoNE, 2018), when performing assessments and evaluations, the objectives and explanations included in the related curriculum should be considered, and attention should be given to ensuring that they are compatible with all components of the curriculum. Assessment and evaluation processes are not restricted to written-oral exams performed by teachers but rather, are conducted for all exams administered by educational institutions (Uzoğlu et al., 2013). The most common of all taxonomies that determine the knowledge and skills that students want to gain and facilitate the mental process is the Original Bloom Taxonomy (OBT) (Bloom, 1956; Bümen, 2006; Grounlund, 1998; Johnson & Fuller, 2006). OBT was refurbished by Anderson and Krathwohl (2001) as a result of innovations in learning (Bümen, 2006; Krathwohl, 2002; Zimmerman & Schunk, 2003). Bloom's taxonomy is a model used to rank the levels of questions in measurement tools applied to determine students' cognitive levels (Güleryüz & Erdoğan, 2018). In Bloom's taxonomy, skills are ranked in hierarchical order according to their complexity and specificity (Demir, 2011). The cognitive domains of the taxonomy include six levels: knowledge, comprehension, application, analysis, synthesis, and evaluation (Bloom, 1956).

A literature review showed that there are many studies on Bloom's taxonomy in the field of science. The subject area, target school level, and the focus of the study of some of the science research studies conducted on this taxonomy are presented in Table 1.

Table 1. Bloom's Taxonomy of Science Studies in Turkey

Subject Area	Target school level	Focus of the study	Reference
Science	Secondary school	LGS and TEOG exam questions	Akyürek (2019)
Science	Primary school	Primary school, third-grade science textbook unit questions.	Dündar (2019)
Science	Primary school	Objectives of third- and fourth-grade science courses in primary school curricula.	Yolcu (2019)
Science	Secondary school	Questions in science and technology curriculum	Güven and Aydın (2017)
Science	Secondary school	Questions in a science and technology textbook	İlhan and Gezer (2017)
Science	Secondary school	Questions in a science and technology textbook	Güven (2014)
Science	Secondary school	Unit questions in science textbooks	Kahramanoğlu (2013)
Science	High School	Unit questions in 9^{th}–12^{th}-grade science textbooks	Davila and Talanquer (2009)
Science	Teacher	Science course exam questions prepared by 5^{th}-grade science teachers	Dindar and Demir (2006)
Science	Undergraduate	Exam questions prepared by preservice teachers	Koray et al. (2004)

As can be seen in Table 1, the studies on Bloom's taxonomy differed in terms of the age and educational level of their target audience. The classification of the questions provided by the taxonomy enables teachers to form questions at the targeted cognitive level and eliminates concerns over asking questions that are at the same cognitive level; in applying this system of classification, teachers can develop their question formation skills (Büyükalan, 2004). Posing questions to students that encourage them to use their knowledge and to effectively engage in problem solving with their knowledge, rather than simply memorizing and recalling, can enhance students' high-level thinking skills. High-level cognitive questions will enable students to establish a connection between new knowledge they will learn and the current knowledge they have and thereby improve their levels of achievement (Çimer, 2007). Machanick (1998) suggests that OBT should be taken as a basis for a more comprehensive review of the topics taught in the curriculum. When literature is reviewed it is a common occurrence to find studies in which the Original Taxonomy is taken as a reference in the evaluation of coursebooks (Assaly & Smadi, 2015; Bıkmaz, 2002; Çepni & Azar, 1998; Eber & Parker, 2007; Gierl, 1997; Jideani & Jideani, 2012; Mizbani & Chalak, 2017; Seo et.al., 2010). There are also studies examining the learning outcomes of the science program, examining the curriculum and assessment tools (Lee, Kim & Yoon, 2015; Green, 2011). While the literature shows that Bloom's taxonomy has been used in studies to classify and determine the content validity of exams/written exam questions, objectives in the curriculum, questions in textbooks/workbooks, and unit questions in textbooks and questions in workbooks; there were no studies specifically evaluating achievement tests, that is, students' current cognitive levels, according to Bloom's taxonomy. In addition, in the Science curriculum, students related to the environment; it is aimed that they can explain the ecosystem and related concepts, question the causes and consequences of environmental problems, gain knowledge and skills for biodiversity, endangered and endangered creatures and what needs to be done to protect these species (MoNE, 2018). In this respect, it was necessary to determine the learning levels of secondary school students regarding the "ecosystem, biodiversity and environmental problems" in the science course curriculum. In this respect, considering the importance of increasing students' current cognitive knowledge levels, studies that focus on determining these levels in students for the purpose of identifying any weaknesses in this area would fill the existing gap on this subject in the science education literature.

Research Aim and Research Questions

The present study aimed to determine secondary science students' knowledge levels on ecosystem, biodiversity, and environmental problems within a science course and to examine the relationship between the students' knowledge levels and their science course grades and gender.

The question of the research is this: Do the knowledge, comprehension, application, and analysis scores of secondary school students have an effect on their science course grades?

The following sub-problems associated with the aforementioned problem were developed to guide the study:

What is the level of the students' knowledge, comprehension, application, and analysis scores?

Is there a significant relationship between the students' science course grades and their knowledge, comprehension, application, and analysis scores?

Are the students' knowledge, comprehension, application, and analysis scores a significant predictor of their science course grades?

Do the students' knowledge, comprehension, application, and analysis scores significantly differ by gender?

Method

Research Methodology

The present study used a survey design, a quantitative research approach. Survey studies focus on determining participants' characteristics, such as their views, interests, or attitudes, regarding a certain topic or event and facilitate the use of larger samples compared to those of other research designs (Büyüköztürk, 2008).

Participants

Participants for the present study were determined using the cluster sampling technique, a probability sampling method. With this method, groups, rather than individuals, are sampled. In this study, 10% of the students in the province where the study was conducted were reached to ensure that the results could be generalized to the accessible universe (Büyüköztürk et al., 2014). A total of 400 eighth-grade students from a public secondary school in Ankara, Turkey during the 2018–2019 academic year constituted the study sample. According to Tavşancıl (2010), the sample to be selected must be at least five times the number of items in the scale and tests to be applied. The student sample of the study was determined by taking the EBÇT test with 30 questions into consideration. Accordingly, 400 students were found to be sufficient for the sample. 212 of the participants were female, and 188 were male. In terms of percentages, these numbers corresponded to 53% female and 47% male.

Instrument and Procedures

Ecosystem, Biodiversity, and Environmental Problems Achievement Test

In the study, the EBET, developed by Aydın and Selvi (2020), was applied to determine the secondary school students' knowledge levels on ecosystem, biodiversity, and environmental problems. The test consists of 30 multiple-choice questions, each with four response options. The KR-20 value of the test was .71, the average discrimination power was .38; and the average item difficulty index was .56, indicating that the test items were at a medium difficulty level and had high discrimination power.

Data Analysis

It took approximately 45 mins for each student to complete the test. Each correct answer was scored one point and each incorrect answer, zero points. To compare the students' scores at different cognitive levels, the equivalents of the scores were calculated as percentages, and the data collected were analyzed using SPSS 17 and Microsoft Excel software. The Pearson correlation coefficient was used to determine the relationship between the students' science course grades and their knowledge, comprehension, application, and analysis level scores. Independent samples t-test was conducted to determine whether the students' knowledge, comprehension, application, and analysis level scores significantly differed by gender.

Results

Findings Regarding the First Sub-problem

Descriptive analysis results regarding the students' knowledge, comprehension, application, and analysis scores are given below in Table 2.

Table 2. Descriptive Statistics Results for Bloom's Taxonomy

Bloom's taxonomy level	N	M	SD	Mode	Median
Knowledge	400	71.36	25.54	87	75
Comprehension	400	71.36	23.00	87	68
Application	400	51.40	30.67	66	66
Analysis	400	31.10	26.54	33	33

Examining the mean (M), median, and mode values of the students' scores given in Table 3, it can be seen that since the mean value is lower than the median value, the scores are skewed to the left. Moreover, the mean and median values were close to each other, which indicates that the related data are normally distributed (Büyüköztürk, 2008). In evaluating the scores out of 100, it was found that on the knowledge and comprehension questions, the students' answers were good; on the application

questions, their answers were at the medium level, and on the analysis questions, their answers were unsuccessful.

Findings Regarding the Second Sub-problem

Results of the Pearson correlation analysis conducted to determine the relationship between the students' science course grades and their knowledge, comprehension, application, and analysis scores are presented below in Table 4.

Table 4. Relationship between Science Course Grades and Knowledge, Comprehension, Application, and Analysis Scores

Variables		Knowledge	Comprehension	Application	Analysis
Science course	r	.445	.460	.276	.040
grade	p	.000	.000	.000	.426
	N	400	400	400	400

A positive, moderately significant relationship was found between the students' science course grades and their scores on the knowledge and comprehension questions but a low-level positive relationship between their science course grades and their scores on application and analysis questions. The correlation with knowledge, comprehension, and application scores and science course grades were significant, as indicated by $p < .05$, whereas the correlation with analysis scores was not significant, as indicated by $p > .05$.

Findings Regarding the Third Sub-problem

Regression analysis was conducted to determine whether the students' knowledge, comprehension, application, and analysis scores were a significant predictor of their science course scores. In a regression analysis, it is necessary to check for any outlier variables, as the existence of outliers makes it difficult to satisfy the "linearity" assumption in a regression analysis. A plot chart, presented in Figure 1 below, was developed to identify any outliers.

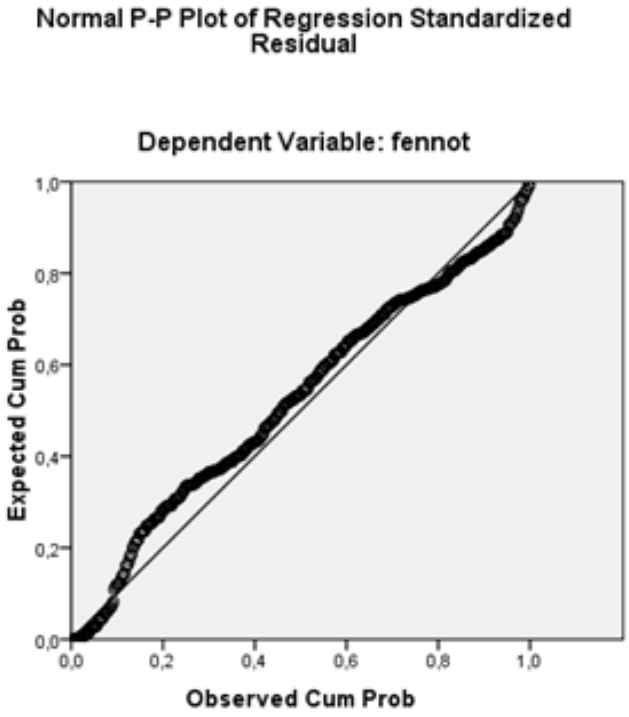

Figure 1. Correlation between the Students' Science Course Grades and Their Knowledge, Comprehension, Application, and Analysis Scores

The plot graph in Figure 1 also presents the correlation between the predictor variable and the dependent variable (predicted, criterion), which shows a positive moderate level relationship between the students' science course grades and their knowledge, comprehension, application, and analysis scores.

Upon meeting the assumptions of linearity and normality, a multiple regression analysis was performed to determine whether the students' knowledge, comprehension, application, and analysis scores predicted their science course grades. The related results are given below in Table 5.

Table 5. Multiple Regression Analysis Results on Whether Knowledge, Comprehension, Application, and Analysis Scores Predict Science Course Grades

Variable	B	Standard Error $_B$	β	t	p	Paired r	Partial r
Constant	56.39	2.20	-	25.65	.000	-	-
Knowledge	0.13	0.04	.21	3.22	.001	0.45	0.16
Comprehension	0.18	0.04	.28	4.13	.000	0.46	0.20
Application	0.50	0.02	.10	2.02	.045	0.28	0.10
Analysis	-0.03	0.03	-.05	-1.19	.236	0.04	-0.06
$R = 0.50$, $R^2 = 0.25$							
$F_{(4, 395)} = 32.15$, $p < .05$							

Regarding the paired and partial correlations between the predictor variables and the dependent variable (predicted, criterion) in Table 5, a positive moderate level relationship was found between knowledge scores and science course grades (r=.45); when the other variables were

controlled, the correlation between these two variables was found to be r=.16. A positive moderate level relationship was found between comprehension scores and science course grades (r=.46); when the other variables were controlled, the correlation between these two variables was found to be r=.20. The relationship between application scores and science course grades was found to be positive and close to a moderate level (r=.28); when the other variables were controlled, the correlation between these two variables was found to be r=.10. Finally, the relationship between analysis scores and science course grades was found to be positive but at a low-level (r=.04); when the other variables were controlled, the correlation between these two variables was found to be negative and low-level (r=-.06).

A moderate level positive relationship was found between the students' knowledge, comprehension, application, and analysis scores and their science course grades (R =.50, R2=.25, p <.05). The students' knowledge, comprehension, application, and analysis scores taken together explained 25% of the total variance in science course grades.

According to the standardized regression coefficient (β), the relative importance order of the predictor variables on the students' science course grades was: comprehension, knowledge, application, and analysis scores. Considering the t-test results on the significance of the regression coefficients, the knowledge, comprehension, and application scores were significant predictors of the students' science course grades, while the analysis scores were not a significant predictor of science course grades (p<.05 for knowledge, p<.05 for comprehension, p = .045 <.05 for application, and p= .236 for analysis).

From the results of the regression analysis, the following regression equation (mathematical model) for the prediction of science course grades was developed:

Science course grade=56.39 + 0.13 (Knowledge) + 0.18(Comprehension) + 0.05(Application) – 0.03 (Analysis)

Findings Regarding the Fourth Sub-problem

Independent samples t-test was performed to determine whether the students' knowledge, comprehension, application, and analysis scores differed by gender.

Table 6. Independent Samples t-Test Results for the Students' Knowledge, Comprehension, and Analysis Scores by Gender

	Gender	N	$\overline{X}$	s	sd	t	p
Knowledge	Female	212	73.70	24.78	398	2.01	.045
	Male	188	68.64	26.17			
Comprehension	Female	212	69.01	20.45	398	3.75	.000
	Male	188	60.54	24.87			
Application	Female	212	53.10	30.81	398	1.18	.238
	Male	188	49.47	30.48			
Analysis	Female	212	28.81	25.30	398	-1.80	.073
	Male	188	33.57	27.73			

As seen in Table 6, the students' knowledge and comprehension scores differed significantly by gender ($t(398)= 2.01$, $p_{Knowledge}=.045 <.05$, and $t(398)= 3.75$, $p_{Comprehension}=.000<.05$); whereas their application and analysis scores did not significantly differ by gender ($t(398)=1.18$, $p_{Application}=.238>.05$, and $t(398)= -1.80$, $p_{Analysis}=.073>.05$). The female students were found to have higher knowledge and comprehension scores than those of the male students (Knowledge=73.70 and Comprehension=69.01), which indicates that the female students responded better to the knowledge, comprehension, and application questions. In addition, the results in students' comprehension scores indicated an effect size such as $\eta 2 = 0.19$. In other words, 0.19% of the reason for the students' comprehension score variability can be attributed to the gender of the students.

Discussion and Conclusion

The present study aimed to determine secondary science students' knowledge levels on ecosystem, biodiversity, and environmental problems in a science course and to examine the relationship between the students' knowledge levels and their science course grades and gender. In a study by Jeffries, Stanisstreet, and Boyes (2001), first-year undergraduate students' thoughts on global warming -Which is one of the most important environmental issues-, and their thoughts on the causes and consequences of global warming were examined. According to the results of the research, it was determined that the students lack the required knowledge and they also had misconceptions regarding environmental problems. In a similar fashion, in another study by Morrone, Mancl, and Carr (2001) it was revealed that the participants had insufficient knowledge regarding environment and environmental problems. A review of the literature on this subject showed that no study evaluated achievement tests according to Bloom's taxonomy.

The present study investigated whether there was a significant relationship between the students' science course grades and their knowledge, comprehension, application, and analysis scores. The results revealed that the students did not have any difficulty in answering knowledge and comprehension questions, had partial difficulty in answering application questions, and had great difficulty in answering analysis questions. Related studies on behaviors and attitudes towards

environmental sustainability (Belen, 2020; Buldur & Ömeroğlu, 2018) found a weak relationship between attitude and behavior and achievement. Çavuşoğlu et al. (2017), in their study, evaluated primary school students' knowledge and attitudes regarding environment and reported a positive but weak relationship between students' knowledge scores and attitude scores. Studies reporting similar results (Derman, 2013; Makki et al., 2003; Uzun, 2007) were found in the literature. These studies found there to be a positive medium level relationship between students' environmental awareness and their learning levels on ecosystem topics. Affective behaviors have been shown to explain 25% of academic achievement (Bloom, 2012). However, in the review, there were studies that used Bloom's taxonomy to investigate exam questions of different courses. For example, Güleryüz and Erdoğan (2018) conducted a study on exam questions of a science course and found that of the questions investigated, 59.5% were at the knowledge level, 20.4% were at the comprehension level, 13.4% were at the application level, 5.2% were at the analysis level, and 1.5% were at the synthesis level, but that none were at the evaluation level. In another study that examines elementary science classroom learning outcomes based on cognitive processes; It is observed that in countries like Singapore and South Korea all learning outcomes are gathered under the umbrella of cognitive processes such as Knowledge, Comprehension, and Application. A lack of learning outcomes was observed in subcategories like Analysis, and Synthesis Evaluation (Lee, Kim & Yoon, 2015). In his doctoral study which investigates teaching strategies of the music classroom and the National Standards of Music Education according to Bloom's Taxonomy, Coleman (2013) suggests that the teachers' usage of metacognitive teaching methods in classroom activities, improved students' Cognitive, Affective and Physical skills. Increasing the number of objectives that correspond to higher cognitive levels could improve the quality of evaluation questions, as well as improve students' higher-level thinking skills. The inability to predict students' science course grades based on their application and analysis cognitive scores suggests that science course grades are not issued according to higher cognitive levels. This may stem from the assessment and evaluation methods used by the teacher or from the low level of the objectives specific to the curriculum.

The present study investigated whether the students' knowledge, comprehension, application, and analysis scores were a significant predictor of their science course grades. The results revealed there to be a significant relationship between the students' science course grades and their knowledge and comprehension scores but no significant relationship between their science course grades and their application and analysis scores. Studies in the related literature showed that questions are mostly gathered under lower stages of the cognitive domain (Altun, 2016; Assaly & Smadi, 2015; Ardahanlı, 2018; Cangüven et al., 2017; Dalak, 2015), and that students who can solve analysis questions are expected to have a good science course grade. Given this information, it was surprising that in the present study, a negative relationship was observed, that is, the students' answers to analysis

questions did not significantly predict their science course grades. There are many studies in the literature that applied Bloom's taxonomy to investigate the learning outcomes of curricula and the exam questions developed by teachers and MoNE. In studies whose aim was to investigate curriculum objectives of different disciplines according to Bloom's taxonomy, it was reported that the objectives were mostly at the lower stages of the taxonomy (Cangüven et al., 2017; Yılmaz & Keray, 2012; Zorluoğlu et al., 2017). There are also numerous studies in the literature that examined the content validity of science questions in TEOG, SBS, and LGS (Coşar, 2011; Şenses, 2008).

The present study investigated whether the students' knowledge, comprehension, application, and analysis scores significantly differed by gender. The results revealed that the students' knowledge and comprehension scores differed significantly by gender, whereas their application and analysis scores did not significantly differ by gender. The knowledge and comprehension scores were found to be higher in the female students, which suggests that the female students, compared to the male students, are more successful in the lower stages of Bloom's taxonomy, such as in knowledge and comprehension. On the other hand, no significant difference was found for the higher stages. In the literature review, there was no study found evaluating an achievement test or scale according to Bloom's taxonomy. However, there were studies examining differences in the learning of environmental issues by gender, and the results reported in these studies were similar to those observed in the present study. In a study by Azapagic, Perdan, and Shallcross (2005), it was determined that gender has no role in the scores of teacher candidates in the achievement test for sustainable environment. Çavuşoğlu et al. (2017), in their study, evaluated primary students' environmental knowledge and attitudes and found there to be a significant difference between environmental knowledge and attitudes in favor of female students and a significant difference in students' environmental knowledge scores in favor of eighth-grade students, compared to their peers. In a study by Çelikbaş (2016), students' awareness about environmental problems, in terms of gender, environmental behaviors, attitudes towards environment, attitudes on environmental sustainability, water footprint, and ecological footprint were determined to be similar before receiving environmental education, yet after receiving environmental education, the female students were reported to have significantly higher awareness about environmental problems, while the male students had significantly more positive environmental attitudes. Sönmez and Yerlikaya (2017), in their study, found that female students, compared to male students, scored significantly higher on both knowledge and attitude levels regarding environmental topics. The present study observed that the female students, compared to the male students, scored higher on the lower cognitive stages, which could mean that female students have more cognitive competence.

Recommendations

The following recommendations are made in light of the findings obtained from the present study:

Further studies should be conducted using qualitative data collection methods to corroborate the quantitative data found in the present study, and students' cognitive levels, as well as their affective levels, in the related topics should be investigated.

Considering that in this study the students' achievement levels were collected at the lower levels of Bloom's taxonomy, these levels should be raised to higher levels by including in-class and extra-curricular teaching activities to activate higher level cognitive skills.

Since the objectives in the current curriculum mostly correspond to the lower levels of Bloom's taxonomy, these objectives should be revised so that they correspond to the higher stages of the taxonomy.

Attention-grabbing supplementary activities should be planned in related topics to increase students' knowledge and comprehension levels.

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Challenges and Solutions of Syrian Refugee Children in the Process of Acquiring Basic Language Skills

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Abstract

The aim of this study is to determine the problems experienced by Syrian refugee children in the 1st grade primary school in the process of acquiring basic Turkish language skills (listening, speaking, reading and writing) and the solutions to these problems according to the views of teachers, parents and students. Since the most Syrian refugees in the world are in Turkey, this study was based on basic language skills in Turkish. This research was designed as a survey model. The study group of the research consists of 126 classroom teachers, 15 parents and 15 students. In the research, criterion sampling method was used to determine the participants to be surveyed, and snowball sampling method was used to determine the participants to be interviewed. The research data were collected with the data collection tool titled "Teachers' Opinions on Basic Language Skills" developed by the researcher and a semi-structured interview form. Frequency (f) and percentages (%) were used in the analysis of quantitative data, and descriptive analysis technique was used in the analysis of qualitative data. It has been concluded that Syrian refugee children have problems in describing the text they listen to determining the subject of what they listen, and answering questions about what they listen. In the study, it was determined that Syrian refugee children had severe problems related to the acquisition and use of basic Turkish language skills. It has been concluded that these children can be solved by providing basic Turkish language skills with contemporary approaches, methods and techniques enriched with appropriate materials and supported by technology and cultural elements.

Keywords: Turkish language, Turkish course, basic language skills, migration refugee children, literacy

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Introduction

The concept of migration can be defined as displacement by moving across international borders or staying within national borders of a State (International Organization for Migration, 2009) as well as a forced migration due to natural disasters, economic, ethnic, religious or political reasons or a search for better working and living conditions (Castles, 2003). Though there are different reasons of migration, common characteristics of the migration are cutting off ties with one's own culture, city and circle, being left homeless and moving to a new and unfamiliar environment. Referring to a move to the unknown above all, migration means reconstructing life, thereby a new work, home, new cultural codes and behaviour patterns, different spatial patterns and new people for the migrant.

Turkey has faced with one of the biggest migration movements of the history due to its geographical borders to neighbouring countries where wars and internal disorders occur and moderate humanist policies towards opening border gates to people aggrieved by their government. In fact, some Turkish cities in the south have hosted Syrian refugees twice as much as its population (Kizil & Donmez, 2017). According to reports of the Directorate General of Migration Management (DGMM), there are 3.664.873 Syrian refugees in Turkey. The number of school-age Syrian refugees children has exceeded 1.6 million (DGMM, 2021).

Education can be described as a crucial and accurate way of solving complicated problems of migrants. According to European Union, education is a necessary and crucial socialization tool for migrants to raise personal qualities and adapt societies that they live in (EU, 2004). A semiliterate migrant will not only fail to create a desirable life and go beyond being a cheap labour for employers but also will always face exclusion (Ager & Strang, 2008). Learning the language of the host country can solve problems aforementioned to a large extent. According to European Union, as language is required for both migrants to express themselves better and more accurately and to communicate and interact with the society they live in, it will be a proper approach to insist on learning language (EU, 2004).

Giving children standard education is crucial to decrease the negative impact of problems arising from migration. It is possible to remark that the acquisition of basic language skills of the host country is a prerequisite of migrant children to benefit from education. For, failure to communicate with people of the host country in a common language makes the orientation harder for migrant children and reduces their academic success. While Roxas (2011) believes that migrant families cannot join school activities due to language incompetence; Rah, Choi and Nguyen (2009) suggest that the academic success of refugee children is negatively affected by language incompetence.

Recent studies have shown that the two most important problems faced by Syrian refugee children are failure to understand what is read and listened and establish verbal and written communication and that both problems mainly stem form language difference (Aykırı, 2017). Apart from socio-cultural and economic problems, the problem of language is one of the chief problems foreign national children encounter (Kiroglu, Kesten & Elma, 2010; Evran, Riedler & Eryaman, 2020). Language, which is vital for mankind to think better, produce, share and live, should be ideally taught from the very beginning of the childhood period (Maden & Durukan, 2011). It is known that speaking a language is a major obstacle that stands in the education process of Syrian refugee children (Emin, 2016; Levent & Cayak, 2017; Ozer, Komsuoglu & Atesok, 2016; Sarıtas, Sahin & Catalbas, 2016; Uzun & Butun, 2016) and that it creates the main difference for the education of them (Demirci, 2015; Seymen & Tok, 2015). Speaking Turkish for Syrian refugees that moved to Turkey is essential in terms of maintaining a regular life, finding a job and continuing their education (Seydi, 2014). Syrians want to learn Turkish in order to meet their basic needs, to get education, to find a job, to work and to eliminate communication problems in daily life (Cangal, 2022).

The main goal of language education at schools is to teach students skills of listening, speaking, reading and writing in accordance with outcomes of the class level and to ensure that they can use these acquisitions efficiently (Gocer, 2015). While listening is defined as understanding what someone says and giving attention to keep what is said; speaking means conveying feelings, thoughts, designs, desires and imaginations after they have been envisioned (Sever, 2015). Having a significant role in communication, speaking skill is an inborn and improvable abilty (Gun & Yigit, 2020). Reading is the process of seeing, perceiving and comprehending a writing along with its words, sentences, punctuations and other elements (Kavcar, Oguzkan & Sever, 2016). Writing is a way of communicating and expressing our feelings, thoughts, designs and what we live (Unalan, 2006).

Language teaching is the primary activity in education, which has important contributions to accommodation of refugee children to the host country apart from keeping them from dangers (Kizil & Donmez, 2017). Having significant characteristics such as interpretation of the world, generation and transfer of ideas, language is the prerequisite of learning (Yalcın & Ozek, 2006). Well developed language skills can increase the likelihood for higher education and social mobility. A clear, understandable and successful communication depends on development of all these skills as a whole (Sever, 1998). This shows that as the basis of language, basic language skills affect the development of other disciplines. It can be said that students' success in education is closely related to rates of knowing language.

In literature review, it is seen that there have been many studies conducted related to general education problems of Syrian refugees. In the study by Tut, Kıroglu and Bayraktar (2018),

perceptions of Syrian and Turkish students related to teachers and school concepts were determined through metaphors. In the study conducted by Boylu (2020), the metaphors of the Syrian refugee students regarding the Turkish Language were determined. In the study conducted by Uzun and Butun (2016), problems of Syrian refugees at preschool institutions were determined based on teachers' views. There was an investigation into education problems of migrants and education activities conducted for migrants in the study of Tuncer and Dikmen (2017). While class teachers' views were determined related to Syrian refugees' problems in education in the study of Aykiri (2017), Levent and Cayak (2017) identified views of school principals about the education of Syrian students in Turkey. Education problems of Syrian refugees living in İstanbul were the subject of the field study of Ates and Yavuz (2017).

There are some studies on problems when learning Turkish as well as problems faced by Syrian refugees that arise from a lack of language knowledge. The study on Turkish perceptions of Syrian refugees by Akkaya (2013); the study on a multidimensional approach to the problems experienced by the classroom teachers with syrian students in their classes by Kara and Ozenc (2021); the study on reading aloud skills of Syrian students learning Turkish at B1 level by Demirci (2015); the study titled Education of Syrian Refugee Children in Turkey: Reflections From the Application by Gurel and Buyuksahin (2020); the study on the problems faced by Syrian students studying in Turkey in learning Turkish by Donmez and Paksoy (2015); the study on the opinions of the instructors who teach Turkish to foreigners on Syrian refugees learning Turkish by Gun (2015); the study on the project of teaching Turkish to Syrian students by Buyukikiz and Cangal (2016) some of these are. Similar to these studies, it has been concluded that most of the educational problems of Syrian refugee children stem from not knowing the language and that these children have difficulty in learning the language of the country they live in.

Within the literature, (Borrell, 2010; Bolukbas, 2016; Dorman, 2014; Keyes & Kane, 2004; McBrien, 2005; Tunc, 2015 etc.) it is often emphasized that refugees are obliged to learn the basic language skills of the host country language to adapt their new place. At this point, among the prominent issues studies are problems arising from a lack of language knowledge, causes and solutions of these problems, what level of language should be taught to refugees and which basic skills of the language should be improved. In this context, it is of importance that language necessities of Syrian refugee children are determined, contents of teaching activities are regulated and suitable teaching environments are organized in accordance with their necessities related to basic language skills. One of the major reasons why this study was grounded on views of teachers, students and parents is that teachers are those who are closest to refugee children as well as know them and their problems very well, and students and parents experience this challenging period in person.

Because there are a few studies in the literature on the problems encountered by Syrian refugee children in the first grade of primary school in the process of acquiring basic language skills and the solutions to these problems, this study will make a significant contribution to the literature and will serve as the foundation to the program/project/activity development that will be designed for refugee students to learn basic language skills. This study is important in that it draws attention to the language learning needs of Syrian refugee children period during the first year of primary school and rigours experienced by them throughout the period of meeting the relevant needs. It is of particular importance as it manifests problems experienced during the acquisition of basic Turkish language skills and solutions for them along with views of teachers who are at the centre of problems, students who experience the problems personally, and parents. An important amount of data is expected to be created for the process of developing programs, projects and activities related to all refugee children's acquisition of basic language skills.

The purpose of this research is to determine the difficulties encountered by Syrian refugee children in the first grade of primary school in the process of acquiring language skills as well as the solutions to these problems according to the opinions of teachers, parents, and students. For this purpose, answers to the following questions were sought:

1. What are the challenges encountered by Syrian refugee children regarding their "listening", "speaking", "reading" and "writing" skills?

2. What are the reasons/resources of the challenges encountered by Syrian refugee children in the process of acquiring basic language skills?

3. How can the challenges encountered by Syrian refugee children in the process of acquiring basic language skills be solved?

Method

Research Model

Aiming to evaluate problems faced by 1st grade primary school Syrian refugee children during the process of acquiring basic Turkish language skills and solutions for them depending on views of teachers, students and parents, this study is a survey model. Within the survey model that aims to portrays a situation in the past or a current situation much the same, an event, individual or object as the research subject is described within its own conditions and as is (Karasar, 2020).

Participants

Since the most Syrian refugees in the world are in Turkey (DGMM, 2021), this study was based on basic Turkish language skills. The participants are comprised of 126 primary school teachers

working at official primary schools whose classes include Syrian students. Criterion sampling method was used in determination of the participants. Defined as study of all cases that meet a series of predetermined criteria (Yildirim & Simsek, 2018), the criterion sampling method is to compose the sample form people, events, objects or situations eligible to the predetermined qualities (Buyukozturk et al., 2021). Selection criteria for the sample in the study were to teach 1st grade class at a primary school and have students who are Syrian refugees. As regards the determination process of teachers, students and parents to be interviewed in the study, snowball sampling method was applied. With reference to the questions of Patton (2018) as "Who can have knowledge on this topic most? Who do you advise me to interview related to this topic?", 26 teachers, 25 Syrian parents and 29 Syrian 1st grade students were determined to be interviewed mutual guidance between participants and researcher. In the province where the research was conducted, there are 176 Syrian refugee students in the 1st grade primary school. 108 of these students are boys and 68 of them are girls. The students of interviewed are 17 boys and 12 girls. The parents of interviewed are 11 male and 14 female. The teachers of interviewed are 14 male and 12 female.

Data Collection Process

Necessary quantitative data for the study were collected through a data collection tool titled "Teacher Views on Basic Language Skills", which was developed by researcher of the study. Having a goal of determining views related to the goals of the study, the data collection tool is a questionnaire of "five point likert type" in which close-ended questions are available. Items (phrases) included in the data collection tool were created from 1st grade primary school basic language skills acquisitions that are involved in Turkish Course Curriculum. Through a literature review and interviews with domain experts, phrases in the scale were graded as "I totally disagree", "I disagree", "I am not sure", I agree" and "I totally agree". To enhance the intelligibility and regularity of the scale in relation to language rules, interviews were made with three class and two Turkish language teacher. As a result of the interviews made, there were some minor corrections that did not change the meaning in some acquisitions in terms of phrases and language rules.

Interview forms consisting of semi-structured open-ended questions were developed by the researcher in order to determine the views of teachers, parents and students on the causes of the problems experienced by Syrian refugee children in the 1st grade of primary school during the process of acquiring basic language skills and the solution of these problems. Semi-structured interview forms are composed of certain questions which are answered by participants as they wish along with clear expression of their personal thoughts (Yildirim & Simsek, 2018). In the interviews, teachers, parents and students were asked two questions each about the reasons for the problems experienced by Syrian refugee children in the 1st grade of primary school during the process of acquiring basic language skills and how these problems could be solved.

The principles of scientific research and publication ethics were meticulously followed in the study. The participants were informed in detail about the research and signed the informed consent form. Voice recordings of the participants were made and notes were taken by obtaining permission. The research data were obtained by means of proven reliability and validity. Interviews were made in person and a translator was hired for interviews with parents and students. Interviews lasted around 15 minutes. Real names of interviewees were kept secret and thus teachers were coded as T1, T2, T3… T26, parents as P1, P2, P3… P25, and students as S1, S2, S3... S29.

Data Analysis

Analysis of Quantitative Data

Frequency (f) and percentage (%) were drawn upon in the analysis of quantitative data obtained from responses of teachers to the data collection tool. Frequency analysis reveals the numerical, percentage and proportional frequency of units and items (Bilgin, 2014). As a result of the statistical analyses, participant levels and numbers of teachers for items within the data collection tool were determined. Following the interpretation of percentages related to responses given, teachers' views on problems of 1st grade primary school Syrian refugee children during the acquisition of basic language skills were presented based on findings of the study.

Analysis of Qualitative Data

Descriptive analysis approach was preferred to analyse the qualitative data obtained through interviews in the study. Within the descriptive analysis, data is summarized and interpreted based on interview questions and direct quotations are taken from interviews of individuals (Yildirim & Simsek, 2018). The reliability of the data obtained from the study was verified through participant confirmation and the analysis of a corresponding expert (Boyatzis, 1998; Creswell & Poth, 2017; Lincoln & Guba, 1985; Miles, Huberman & Saldana, 2020) and the validity and reliability of the qualitative aspect of the study were tested in consideration of cogency, transmissibility, consistency and approvability (Yıildirim & Simsek, 2018). Sound recordings of interviews with teachers were analysed at two different times andhh percentage agreement in both analyses (Bakeman & Gottman, 1997) were found as 93%. According to Keeves and Sowden (1994), 80% refers to an agreement rate that is sufficient for reliability. Moreover, for a broader data analysis, a corresponding expert in the field of education sciences was present in the study (Lincoln & Guba, 1985), and texts containing participant views were investigated separately by researcher and the corresponding expert and efficient discussions were made on responses by participants. As working on verbal speeches that were converted into written texts along with interviewees corroborates the reliability and validity of data (Silverman, 2006), sound recordings converted into written texts by researcher and notes taken

during interviews were confirmed by being controlled by class teachers and parents as well as students.

Findings

Findings related to the basic language skills of "listening", "speaking", "reading" and "writting"

Teachers' opinions on the problems that Syrian refugee children in the 1st grade primary school experience in the process of acquiring basic language skills in listening, speaking, reading and writing are presented in Table 1, Table 2, Table 3 and Table 4.

Table 1. Teachers' views on problems experienced by Syrian refugee children related to the basic language skill of listening

Basic Language Skill of Listening	I totally agree		I agree		I am not sure		I disagree		I totally disagree	
	f	%	f	%	f	%	f	%	f	%
…distinguishes between sounds coming from natural and artificial sound sources.	70	55.56	35	27.78	0	0.00	14	11.11	7	5.56
…imitates sounds heard.	84	66.67	27	22.22	0	0.00	7	5.56	7	5.56
…distinguishes between letters corresponding to sounds.	28	22.22	56	44.44	7	5.56	21	16.67	14	11.11
…makes a prediction on the text to be listened and watched based on visuals.	28	22.22	56	44.44	7	5.56	21	16.67	14	11.11
…makes a prediction on the course of events happening during listening	28	22.22	42	33.33	21	16.67	21	16.67	14	11.11
…explains the text that is being listened and watched.	7	5.56	14	11.11	7	5.56	35	27.78	63	50.00
…identifies the subject of what is listened	14	11.11	21	16.67	0	0.00	35	27.78	56	44.44
…answers questions related to what is listened and watched.	21	16.67	21	16.67	14	11.11	49	38.89	21	16.67
…practises verbal directives.	28	22.22	42	33.33	21	16.67	21	16.67	14	11.11
…practises listening strategies.	21	16.67	49	38.89	7	5.56	28	22.22	21	16.67
…grasps non-verbal messages of the speaker.	28	22.22	42	33.33	14	11.11	21	16.67	21	16.67

Table 1 shows that teachers declared positive opinions on students' skills of distinguishing between sounds coming from natural and artificial sound sources, imitating sounds heard, distinguishing between letters corresponding to sounds, making a prediction on the text to be listened and watched based on visuals, making a prediction on the course of events happening during listening, practicing verbal directives, practicing listening strategies and grasping non-verbal messages of the speaker, and that teachers declared negative opinions on their skills of explaining the

text being listened and watched, identifying the subject of what is listened and watched and answering questions related to what is listened and watched.

Table 2. Teachers' views on problems experienced by Syrian refugee children related to the basic language skill of speaking.

Basic Language Skill of Speaking	I totally agree		I agree		I am not sure		I disagree		I totally disagree	
	f	%	f	%	f	%	f	%	f	%
…uses words that are appropriate for the meaning.	14	11.11	21	16.67	14	11.11	49	38.89	28	22.22
…extemporises.	28	22.22	30	33.33	7	5.56	28	22.22	21	16.67
…talks about a certain topic with a framework.	14	11.11	21	16.67	7	5.56	49	38.89	35	27.78
…makes level-appropriate sentences that express his/her own thoughts and feelings.	14	11.11	28	22.22	21	16.67	42	33.33	21	16.67
…speaks with a proper tone of voice by making eye contact.	35	27.78	35	38.89	7	5.56	21	16.67	14	11.11
...pronounces words correctly when speaking.	14	11.11	21	16.67	14	11.11	49	38.89	28	22.22
…is good at public speaking.	14	11.11	28	22.22	21	16.67	42	33.33	21	16.67
…talks and discusses about a topic with his/her peers, and adults.	21	16.67	28	22.22	14	11.11	42	33.33	21	16.67
…explains familiar people, places, and facts, and expresses thoughts and opinions related to these.	14	11.11	21	16.67	21	16.67	42	33.33	28	22.22

Table 2 shows that while teachers declared positive opinions on students' skills of speaking with a proper tone of voice by making eye contact and extemporising, they declared negative opinions on their skills of using word that are appropriate for the meaning, talking about a certain topic with a framework, making level-appropriate sentences that express their own thoughts and feelings, pronouncing words correctly when speaking, being good at public speaking, talking and discussing about a topic with their peers, and adults, explaining familiar people, places, facts, and expressing thoughts and opinions related to these.

Table 3. Teachers' views on problems experienced by Syrian refugee children related to the basic language skill of reading.

Basic Language Skill of Reading	I totally agree		I agree		I am not sure		I disagree		I totally disagree	
	f	%	f	%	f	%	f	%	f	%
...identifies basic sections in reading materials.	63	50.00	42	33.33	0	0.00	14	11.11	7	5.56
…identifies and vocalises the letter.	35	27.78	49	38.89	0	4.00	28	22.22	14	11.11
…reads syllables and words.	28	22.22	42	33.33	7	5.56	28	22.22	21	16.67
…reads simple and short sentences.	28	22.22	35	27.78	14	11.11	28	22.22	21	16.67
…reads short texts.	21	16.67	35	27.78	21	16.67	28	22.22	21	16.67
...reads paying attention to punctuations.	21	16.67	28	22.22	21	16.67	35	27.78	21	16.67
...reads paying attention to stress, intonation and pronunciation.	14	11.11	21	16.67	21	16.67	42	33.33	28	22.22
…reads writings written with different typefaces.	21	16.67	21	16.67	21	16.67	42	33.33	21	16.67
…practises reading strategies.	28	22.22	42	33.33	21	16.67	21	16.67	14	11.11
…answers text-related questions.	21	16.67	28	22.22	7	5.56	42	33.33	28	22.22
…identifies title/s suitable for the text content.	14	11.11	21	16.67	21	16.67	49	38.89	21	16.67
…reads poems.	28	22.22	42	33.33	7	5.56	28	22.22	21	16.67

Table 3 shows that teachers declared positive opinions on students' skills of identifying basic sections in reading materials, identifying and vocalising the letter, reading syllables and words, reading simple and short sentences, reading short texts, practising reading strategies and reading poems, and that they declared negative opinions on students' skills of reading by paying attention to punctuations, reading by paying attention to stress, intonation and pronunciation, reading writings written with different typefaces, answering text-related questions and identifying title/s suitable for the text content.

Table 4. Teachers' views on problems experienced by Syrian refugee children related to the basic language skill of writing.

Basic Language Skill of Writing	I totally agree		I agree		I am not sure		I disagree		I totally disagree	
	f	%	f	%	f	%	f	%	f	%
…paints and does line drawing.	63	50.00	42	33.33	0	0.00	14	11.11	7	5.56
…writes letters according to the technique.	14	11.11	28	22.22	14	4.00	42	33.33	28	22.22
…writes syllables and words.	28	22.22	42	33.33	7	5.56	28	22.22	21	16.67
…writes numbers according to the technique.	14	11.11	28	22.22	14	11.11	42	33.33	28	22.22
…writes meaningful and regular sentences.	21	16.67	28	22.22	21	16.67	35	27.78	21	16.67

...writes visuals-related words and sentences.	28	22.22	42	33.33	14	11.11	28	22.22	14	11.11
…leaves suitable blanks between syllables, words and sentences.	21	16.67	28	22.22	21	16.67	35	27.78	21	16.67
…uses capitals and punctuations properly.	21	16.67	21	16.67	21	16.67	42	33.33	21	16.67
…practises writing strategies.	28	22.22	42	33.33	21	16.67	21	16.67	14	11.11
…revises what s/he has written.	35	27.78	42	33.33	7	5.56	28	22.22	14	11.11
…shares what s/he has written.	35	27.78	49	38.89	0	0.00	21	16.67	21	16.67

Table 4 shows that teachers declared positive opinions on students' skills of painting and doing line-drawing, writing syllables and words, writing visuals-related words and sentences, practising writing strategies, revising what has been written and sharing what has been written, yet they declared negative opinions on students' skills of writing letters and numbers according to the technique, writing meaningful and regular sentences, leaving suitable blanks between syllables, words and sentences and using capitals and punctuations properly.

Findings related to the reasons/resources of the challenges encountered by Syrian refugee children in the process of acquiring basic language skills

In the interviews, the reasons/resources of the challenges encountered by Syrian refugee children in the process of acquiring basic language skills were asked, and some of the answers given by the teachers are summarized below:

> *"These children have not gotten over the trauma caused by the migration yet. This situation negatively affects the education process."* (T2)
>
> *"A limited fulfilment of these children's needs in terms of accommodation, food, heating, and dressing leads the education and language learning process to be ignored."* (T8)
>
> *"Exclusion and isolation of these students at places of residence and schools prevents them from active participation in education activities and benefit from them properly."* (T10)
>
> *"These children have not yet fully recovered from the impact of their own culture and mother tongue. They necessarily tend to speak in Arabic among themselves and learn Turkish language rules in the context of those of Arabic."* (T12)
>
> *"The lacuna within basic Turkish language skills is a huge problem that affects students' success in other courses. These negativities lead these students to be stigmatized as 'lazy students' at schools and demoralize and demotivate them in learning language."* (T18)
>
> *"These students have difficulty in learning pronunciation, intonation and stress in Turkish due to the language structure and pronunciation in Arabic. Besides, the fact that Arabic is*

written and read from right to the left is an obstacle for them in learning basic Turkish language skills." (T20)

***"**As parents of these children also cannot speak Turkish, they are not backed up at home and thus, this disrupts the acquisition of basic language skills."* (T23)

It is understood from teachers' views that among the causes of problems experienced by 1st grade primary school Syrian refugee children related to the basic Turkish language skills acquisition are that these children have not fully gotten over the trauma caused by the migration yet; that they have restricted living conditions; that they are being excluded and isolated from the society and school environment; that they depend on their culture of origin and mother tongue; and that Arabic language structure is different from that of Turkish and their parents cannot speak Turkish either.

In the interviews, the reasons/resources of the challenges encountered by Syrian refugee children in the process of acquiring basic language skills were asked, and some of the answers given by the parents are summarized below:

"*We were living in better conditions in our country. Here our children do not have a nice house, good food or dresses. This demoralizes them and cause them to discountenance the school."* (P3)

"*My child remains in between Arabic and Turkish spoken at school and has difficulty in learning the language as language rules and writing of both languages are different from each other."* (P8)

"*As my child has not gotten over the effect of problems in our country, s/he does not want to go to school and always utters that s/he misses our village in Syria."* (P12)

"*My child becomes an object of derision as s/he cannot speak Turkish at school. To avoid this, s/he does not speak Turkish unless s/he is supposed to speak and this delays learning Turkish."* (P20)

"*And we cannot support him/her at home about Turkish and other courses as we also do not know Turkish. Children cannot succeed unless their parents help them about courses."* (P24)

It is understood from parents' views that among the causes of problems experienced by 1st grade primary school Syrian refugee children related to the basic Turkish language skills are nonfulfillment of their basic needs such as accommodation, food and dressing, failure to fully get over shortcomings in the country of origin, becoming an object of derision, differences between the two languages and their parents' inability to speak Turkish.

In the interviews, the reasons/resources of the challenges encountered by Syrian refugee children in the process of acquiring basic language skills were asked, and some of the answers given by the studens are summarized below:

> *"Turkish is unlike Arabic. Writing of both languages is different. I think Arabic is easy but Turkish is very difficult."* (S7)
>
> *"I do not want to learn Turkish as we will be back to our country soon and I will go to school there anyway."* (S12)
>
> *"Other children make fun of me when I speak Turkish at school. I get sad a lot then and avoid speaking. I know the answers of questions asked by our teacher yet do not raise my hand."* (S21)
>
> *"If my mum knew Turkish, she would teach me at home, but we do not communicate in Turkish at home. My elder brother speaks Turkish better than all of us, yet we speak in Arabic at home."* (S25)
>
> *"I do not have many friends at school. Turkish children do not want to play with us. We Syrians play together and speak in Arabic among ourselves."* (S29)

It is clear from views of children that they have problems related to the acquisition process of basic Turkish language skills as their parents do not know Turkish and communicate in Arabic with them at home, they are scare of being mocked when speaking Turkish, play and speak Arabic between themselves rather than with Turkish children, and language differences between the two languages makes them think that Turkish is hard to learn.

Findings related to the solving challenges encountered by Syrian refugee children in the process of acquiring basic language skill

The opinions of the teachers on the solution of the problems that Syrian refugee children face in the process of acquiring basic language skills are as follows:

> *"First off all, migration-based traumatic problems of these children should be solved along with a fulfilment of their needs such as accommodation, food, heating and dressing."* (T3)
>
> *"These children should be given an education that does not disregard their own language and culture. This situation will make them welcome activities of language teaching."* (T8)
>
> *"First, exclusion and isolation of these children both at home and school should be eliminated since in case of these incidents, they will cave in and thus their education will be affected badly."* (T11)

"These children should be given non-formal education of Turkish language or extra Turkish language courses at schools." (T14)

"By means of mass communication, programs should be applied related to teaching Syrian refugee children basic Turkish language skills." (T21)

"An atmosphere of tolerance should be created by eliminating prejudices and misconceptions between the two societies. If it is achieved, this can accelerate the process of Turkish language learning by putting away the antipathy towards Turkish or persistency in speaking Arabic." (T24)

"To ensure that parents have active participation in the education of their children and support them at home, they can also be given Turkish courses." (T26)

To solve the problems experienced by 1st grade primary school Syrian refugee children related to the basic Turkish language skills, teachers are seen to recommend that firstly migration-based traumatic problems of these children should be resolved along with ideal living conditions for a human such as accommodation, food, heating and dressing and an education that does not disregard their own language and culture, and that exclusion and isolation of these children should be prevented. It is also recommended that these children should be given extracurricular education in teaching Turkish language along with a similar non-formal education in language teaching for their parents, and that understanding-and-tolerance-based relationships should be established between both societies through practices that represent and bind them together.

The opinions of the parents on the solution of the problems that Syrian refugee children face in the process of acquiring basic language skills are as follows:

"First of all, problems of our children should be solved by providing them with better housing and living conditions." (P1)

"Derision towards our children by Turkish children due to their bad Turkish speaking should be prevented and a good friendship atmosphere should be created. If it is achieved, our children will speak with them more and thus learn Turkish faster." (P9)

"In order for our children learn Turkish well, we should help them at home. For this, parents should be given free-of-charge Turkish courses and close relations should be retained between Turkish families and us." (P15)

"Our children should be given free Turkish language education at school and out of school." (P23)

"To maintain that our children learn Turkish better and socialize with other Turkish children, social activities and family visits should be arranged." (P25)

It is seen that regarding problems of 1st grade primary school students related to the acquisition of basic Turkish language skills parents recommend that first of all, migration-based problems of these children should be solved, better living conditions should be maintained, derision towards them should be eliminated in case of bad Turkish speaking, these children should be provided with free education of Turkish language at or out of school, their parents also should be given free courses of Turkish language and to maintain the amalgamation of families, social activities and family visits should be arranged.

The opinions of the students on the solution of the problems that Syrian refugee children face in the process of acquiring basic language skills are as follows:

"If I go to the course, I will learn Turkish soon." (S3)

"If I had more Turkish friends and played with them more, then I could learn Turkish better. Yet they should not laugh at me." (S10)

"If my parents learn Turkish, I can learn better from them at home. In this case, we do not have to communicate in Arabic at home." (S15)

"If we had a nice house at which I could have my own room, then I could study better and learn Turkish at better levels. Yet our house is small. (S20)

"If there were teachers speaking both Turkish and Arabic, then it would be better as they could help us more." (S26)

It is understood from recommendations of students related to solutions to the problems related to the acquisition of basic Turkish language skills that Turkish courses should be opened, they should socialize more with Turkish students, parents should be taught Turkish, better living conditions and opportunities for studying should be maintained, they shouldn't be mocked when speaking in Turkish and teachers speaking Turkish and Arabic should be employed at schools.

Discussion, Conclusion and Recommendations

Considering findings related to problems experienced by 1st grade primary school Syrian refugee children during the process of acquiring the listening skill, it was found that these children had difficulty in explaining a text being listened, identifying the subject of what is listened and watched and answering questions related to what is listened and watched. This result shows that the listening language skill which is based on comprehension have not been acquired completely. Remarks by Syrian refugee children that they would want to have a listening course most followed by

speaking within the study conducted by Bolukbas (2016) reveals the inadequacies of this basic language skill. It was determined in the study by Aykiri (2017) that failure to understand what someone is saying and communicate is the most important problem in the education of Syrian refugee children. It was concluded in the study by Coskun and Emin (2016) that class teachers could teach Syrian refugee children writing-reading skills in Turkish, however, that they were poor at teaching them effective listening, understanding and comprehension skills. Listening is the action of understanding the message of the speaker smoothly and being able to respond the relevant stimulus (Demirel & Sahinel, 2006). As listening is a necessary language skill for communication in daily life and for learning in education (Ministry of National Education, 2019) and language teaching begins and develops through listening (Demiral & Yavuz, 2016), failure to satisfactorily acquire the skill of listening leads to setbacks not only in daily life but also in education for children.

Considering findings related to problems experienced by 1st grade primary school Syrian refugee children during the process of acquiring the speaking skill, it was found that these children had problems in using words in appropriate meanings, speaking about a subject within a framework, making appropriate-level sentences that reflect their thoughts and feelings, accurate pronunciation of words, speaking out or discussing a topic with peers or adults, and explaining known people, places and events and expressing feelings and thoughts related to them. This finding represents that Syrian refugee children are not able to express their thoughts, feelings, conceptions and observations through appropriate-level vocabulary in Turkish. Besides, these findings reveal that Syrian refugee children are not able to use appropriate and applicable words and pronounce words accurately as they have not comprehended the phonetics of Turkish language. In studies by Bolukbas (2016), and Donmez and Paksoy (2015), it was determined that Syrian refugee children had difficulty mostly in speaking. Among the most significant problems of education, for Syrian children are not to be able speak and communicate effectively and fluently (Bahadir & Ucku, 2016; Coskun & Emin, 2016; Eryaman & Evran, 2019; Levent & Cayak, 2017; Tunc, 2015). Kesten, Kiroglu and Elma (2010), Aykiri (2017), and Demirci (2015) found that cross-language differences caused problems for Syrian refugee children in acquiring the speaking skill.

Considering findings related to problems experienced by 1st grade primary school Syrian refugee children during the process of acquiring the reading skill, it was found that these children had difficulty in reading by paying attention to punctuations, stress, intonation and pronunciation, reading writings written with various typefaces, responding questions related to a text and identifying proper title/s for the text content. This finding shows that Syrian refugee children are not able to make rules in reading Turkish into knowledge and skill, read a text orally or silently at an appropriate level to interpret a text accurately and draw upon sources written with various typefaces. Studies have shown that due to phonetic differences as well as differences of origin and structure between Arabic and

Turkish, Syrian children cannot fully acquire reading skills (Aykiri, 2017; Demirci, 2015; Donmez & Paksoy, 2015; Gozubuyuk, 2017). Reading is the action of seeing, perceiving and comprehending writings, words, sentences, punctuations and other elements. As Syrian refugee children do not have basic Turkish language skills, they are often not able to realize specifics and details within reading texts and vocalize writings without understanding and comprehending them. However, reading is not only a vocalization but also an action of seeing, perceiving, understanding and comprehending words, sentences or writings with its all elements (Sever, 2003). As reading skill ensures that a person adapts the society and cultural surrounding s/he lives in and gets prepared better for the future by gaining knowledge and experience, it is of utmost importance for Syrian refugee children to learn this skill efficiently.

Considering findings related to problems experienced by 1st grade primary school Syrian refugee children during the process of acquiring the writing skill, it was found that these children had difficulty in writing appropriate letters and numbers, making meaningful and regular sentences, leaving appropriate spaces between words and sentences and using appropriate capitals and punctuations. The finding shows that Syrian refugee children are not able to write regularly and neatly, thus they are not able to express in written what they hear, think, envisage, observe and interpret. Aykiri (2017) determined that Syrian refugee children had serious problems in writing skill. Syrian refugee children have the most difficulty in writing skills after speaking basic language skills (Bolukbas, 2016; Donmez & Paksoy, 2015). According to Demiral and Yavuz (2016), one of the reasons that hamper the acquisition of the writing skill is that students confuse language rules and word orders in the sentence of the target language with those of their mother tongue. Reasons such as alphabetic difference as well as differences of origin and structure between Turkish and Arabic may lead Syrian students to fail to fully acquire writing skill. Having problems related to the writing skill and failure to express themselves in written leads Syrian students to face many problems that make their life harder.

Syrian refugees should learn Turkish to adapt Turkish manners and customs and culture. This is because it is not possible for refugees to merge with Turkish society without a good knowledge of Turkish (Karasu, 2017). Studies conducted have shown that one of the major problems faced by Syrian refugee children is not to speak Turkish and that due to their lack in basic Turkish language skills, they are not able to communicate with their peers and teachers and express themselves proficiently (Simsir & Dilmacç, 2018; Uzun & Butun, 2016). Other studies have revealed that Syrian refugee children experience isolation due to linguistic and cultural differences (Kirova, 2001; Suarez-Orozco & Suarez-Orozco, 2001). Given that communication and interaction between teachers and parents set ground for the education process, failure to fully acquire Turkish language skills implies that refugee children will be deprived of knowledge, skills and attitudes taught at school. Besides, this

failure can also prevent them from socializing by hampering their communication process with peers and can give rise to isolation.

Following recommendations can be given based on the findings of the study:

1. It should be kept in mind that Syrian refugee children may have suffered or have been suffering bad health conditions, anxiety, mistrust, hyper-alertness, concentration problems, depression and post-traumatic stress disorder.

2. Teachers who are supposed to teach Syrian refugee children basic Turkish language skills should be trained on issues such as multicultural perspective, unbiased thinking, tolerance to the diversities, indulgence, patience, empathy and showing tolerance, and teachers who have interiorized these human values should be commissioned.

3. Class teachers of Syrian refugee children should pay utmost attention to their micro level discourses and be sensitive to verbal and nonverbal behaviours and attitudes of these children who cannot express themselves comfortably due to the lack of basic Turkish language skills.

4. Syrian refugee children should be given courses of basic Turkish language skills prior to 1st grade primary school.

5. Syrian refugee children should be given courses of basic Turkish language skills during social activities at school, out of school or at the weekends depending on their progress on basic language skills.

6. Standards applicable in teaching basic Turkish language skills should be specified by the Ministry of National Education and in accordance with these standards, suitable resources should be made available, syllabi should be prepared, teaching materials should be developed and teachers should be assigned.

7. Parents of children should also be given courses related to Turkish language teaching to ensure that they have active participation in activities related to basic Turkish language skills at schools and support them during this education.

8. For a fruitful Turkish language teaching process, social media and mass communication should be used at high levels, and teachers should be given in-service training on how to teach foreigners basic Turkish language skills.

9. To provide fields and facilities which will be used by refugee children when learning basic Turkish language skills, physical conditions and social activities should be maintained at particularly provinces and districts where temporary refuge centres are available, and at residential areas densely populated by these children.

10. Traditional methods should be abandoned in teaching Syrian refugee children basic Turkish language skills and instead of these; stimulus-rich environments should be used with modern approaches, methods and techniques as well as technology-and-culture-aided-materials.

11. Other studies related to Syrian refugee children in Turkey including their educational experiences, relationships with peers and parents, successful migration strategies, language proficiencies, sense of belonging to school, psychosocial adaptations and academic achievements should be conducted.

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The Relationship Between the Levels of Social Support That Middle and High School Students Receive during the Physical Activities and Their Happiness

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Abstract

This study aims to examine the relationship between the middle and high school students' perceptions of social support they receive from their parents and peers during the physical activities and their happiness. Middle and high school students voluntarily participated in this research. 460 forms were obtained from the participants and accepted as data. The obtained data from middle and high school students were grouped, and the differences and relationships were analyzed. In the study, it was determined that the social support levels of middle school students for physical activities from their peers and parents were higher than that of high school students. Moreover, it was concluded that as the level of received social support by students from their peers and parents for physical activities increased, their happiness levels also increased.

Keywords: Physical Activity, Social Support, Happiness, Peer, Parents

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Introduction

Human relations are a set of subjects that originate from the will to live together and must be handled in a multi-disciplinary manner. The quality of the social relations, which developed thanks to human communication and interactions, affects individuals directly. Determining positive and negative social effects can contribute to developing appropriate human relations.

People who live with other individuals in society, by their nature, gain various benefits from the social relationships they develop. The stronger the positive social relationships that the individual develops, the more positive the psychological health of the individual will be (Doğan and Sapmaz, 2012). From this point of view, the significance of strengthening social relationships is revealed. Besides the tools such as culture and art, which intensify the social relationships, physical activities can also have important roles in developing positive relationships by bringing people together.

Concerning a set of daily routine physical activities, physical activities are also phenomena that develop individuals in terms of physiology, psychology, and sociology (Yıldırım and Bayrak, 2019). Furthermore, as well as increasing the quality of life, physical activities are one of the elements which become helpful in establishing and maintaining social relationships in a healthy way (Dinç et. al., 2018). In encouraging individuals to participate in physical activities, the support they recieve from their peers and parents is also of great importance.

Social Support of Parents in Physical Activities

Social support is characterized as individuals' being in a social structure in which they get help from other individuals whom they consider important and valuable (Lepore, Evans and Schneider, 1991; Saygın and Arslan, 2009). On the other hand, the emotional and social support one gets from these connections is also covered by the social support term (Yıldırım, 1997).

The primary social structure provides social support for the individual in the family (Traş and Arslan 2013). The parents, from whom the child gets support in terms of acquiring basic needs, support the child also in terms of socializing. Following childhood, the parents also facilitate help in the socialization of the adolescents (Bugental and Goodnow, 1998). It is an anticipated result that social support will also help individuals in overcoming the obstacles they encounter. In addition to the social support which is provided by the parents in the early years of life, the social support which is provided by peers during adulthood will contribute to the physical and psychological well-being of the individual (Aksoy, et. al., 2018).

Social Support of Peers in Physical Activities

While maintaining social interactions with parents, individuals can also develop similar interactions with other people. Besides the family, the close connections, who are impressive over one's life and regarded as important, make the other social support sources. As well as spouses, relatives, and teachers, friends are also among the social support sources (Gündoğan and Sargın, 2018).

Individuals, who experience various social phases throughout life, can be expected to receive social support from different sources (Öztürk, 2015). Childhood and adolescence periods particularly are of significance in terms of getting social support from peers besides parents (Malkoç and Yalçın, 2015) The adolescent individual who is struggling to discover and admit himself/herself, contributes positively to his/her mental health thanks to the social support (Akın and Ceyhan, 2005).

Along with emotional development, peer relations fulfill important functions for social development (Yörükoğlu, 2012; Hong, Espelage, and Sterzing, 2017; Pehlevan and Bal, 2018). Physical activities, which can develop peer relationships, provide a convenient atmosphere for the psycho-social development of individuals. Getting involved in such activities enable the development and strengthening of interpersonal interactions by providing socializing opportunities (Ramazanoğlu et. al., 2005). Furthermore, sportive activities, which contribute to the socialization of individuals, will also satisfy the need for belonging to a group (Pehlevan and Bal, 2018). The individuals, who receive support for the satisfaction of this need and get involved in the activities, will feel its positive effects .

The Relation of Social Support and Happiness in Physical Activities

Physical activities and happiness levels are directly interrelated, and it is stated that happiness level increases with the intensity of physical activity (Richards et. al., 2015). These activities are defined as the activities which enable learning social skills such as coming together, cooperating, and having common values through communication (Küçükibiş and Eskiler, 2019). When they participate in physical activities, children and adolescents make new friends while they are having an enjoyable time. Besides contributing to physical development, such activities also support psychological well-being (Başar, 2018).

The positive relationships we develop with our families and friends, who have been supportive since childhood, will make us feel well (Yalçın, 2015). On the other hand, when social relations are inadequate or ruined, it is inevitable for the individual to experience negative feelings and have mental health disturbances. Adolescence, in which the social identity develops, is a transition phase in terms of getting social support from parents and peers (Kuzucu et. al., 2020; Avcı, 2010). Therefore, it is thought that the presence of someone from whom middle school and high

school students can receive social support in various ways will be an effective factors on the adolescents' happiness.

Purpose of the Study

This study aimed to examine the relationship between the social support that middle and high school students receive from their parents and peers during physical activities and their happiness levels. In this context, answers to the following questions were sought;

1. Is there a relationship between the levels of social support that students receive from their parents in physical activities and their happiness levels?

2. Is there a relationship between the levels of social support that students receive from their peers in physical activities and their happiness levels?

Method

Research Model

This study aimed to analyze the relationship between happiness level and perception of social support middle school and high school students receive from their parents and peers for physical activities. The study is based on a quantitative research pattern. A general survey model was utilized in the study. The general survey model is "*the survey model which studies the whole universe or a sample of it to reach to a conclusion about the universe which consists of several members*" (Karasar, 2012).

Participants

460 middle school and high school students participated voluntarily in the study. 217 (47,2%) of the participants are girls (female) and 243 (52,8%) of the participants are boys (male). All of the students are receiving their education in the Turkish provinces of Samsun, Rize, and Erzurum in the 2020-2021 academic year.

Table 1. Demographics of the Participants

		N	%
Gender	Female	217	47.2
	Male	243	52.8
Physical Activity Involvement	Yes	147	32.0
	No	313	68.0
Educational Status	Middle School	346	75.2
	High school	114	24.8
Total Number of Participants		460	100.0

In Table 1, the gender, grade, and physical activity involvement levels of the participants are analyzed. When the gender range of the participants is regarded, we can see that 217 (47,2%) of the participants are girls (female) and 243 (52,8%) of them are boys (male). While 32% of the participants are having their middle school education, 68% of them are in high school. In terms of physical activity involvement, 75,2% of the participants are active while 24,8% of them are passive.

Data Collection Tool

Face-to-face and online survey methods were used, and a list of questions (personal info form) and two different scales were applied to the participants.

Personal Information Form

The personal information form consisted of questions about the participants' age, gender, and education level.

Social Support Scale for Physical Activities

Farias Jr. et. al.'s "*Social Support Scale for Physical Activities* (SSSPA)" (2014), which was adapted into Turkish by Küçükibiş and Eskiler (2019), is utilized. SSSPA consists of 10 clauses. Scale also includes two sub-dimensions: parent social support and peer social support. The scale is in a quadruple grading pattern (0=Never – 3=Always) and does not include reverse clauses.

Happiness Scale

The "*Happiness Scale*", developed by Demirci and Ekşi (2018) to measure the happiness levels of the participants, consisting of 6 items and a single dimension, was used. There was no reverse item on the scale.

Data Collection

Legal permission and ethical compliance reports were obtained from official authorities to apply the questionnaires to the determined sample group. To collect the data accurately, help was received from physical education and sports teachers. Participants were informed about the research and their voluntary participation was requested. The students answered the questionnaires in 10±5 minutes.

Ethical Clearance

Sivas Cumhuriyet University Scientific Research and Publication Ethics Committee approved this study (Approval no. 60263016-050.06.04-E.494574/ 04/12/2020). Informed consent forms were provided by all participants.

Data Analysis

The data was analyzed via IBM SPSS 22.0. First of all, the data were checked for normal distribution, and multicollinearity and linearity controls were carried out (Altunışık et. al., 2012; Büyüköztürk et. al., 2016). Upon this evaluation, the data is proven to be linear. The values are checked between ±2 and included in the data pool (George and Mallery, 2003). Furthermore, definitive statistics were used during the analysis, a t-test was used to define the variables, and regression analysis was utilized to analyze the relationships among variables.

Results

In this part of the study, findings and interpretations are included.

Table 2. Definitive Statistics about Variables of the Study

Variables	$\bar{X}$	Ss	Skewness	Kurtosis	A
Parental Social Sup.	1,21	,762	,130	-,818	,78
Peer Social Sup.	1,50	,833	-,139	-,863	,83
SSSPA	1,35	,682	-,043	-,698	,84
Happiness Scale	2,79	,882	-,752	,403	,81

In Table 2, the mean of peer social support sub-dimension (1,50) appears to be higher than the mean of parent social support (1,21). While Cronbach's alfa reliability coefficient of parent social support is 0.78, it is 0.83 for peer social support. Also, while the internal consistency reliability coefficient of the whole scale is 0.84, it is 0.81 for the happiness scale. According to these findings, it is safe to state that the scale is highly reliable, based on the validity and reliability analysis of the scale.

Table 3. Comparison of Participants' Physical Activity Social Support Perceptions and Happiness Levels by Gender

Variables		Gender	N	$\bar{X}$	S.D.	t	p
SSSPA Sub Dimensions	Parental Social Support	Female	217	1,13	,754	-2,218	,068
		Male	243	1,29	,764		
	Peer Social Support	Female	217	1,46	,810	-1,900	,281
		Male	243	1,54	,854		
SSSPA Total		Female	217	2,83	,664	-1,080	,058
		Male	243	2,77	,694		
Happiness Scale		Female	217	1,29	,917	,682	,496
		Male	243	1,42	,853		

*p<0,05 SSSPA = Social Support Scale for Physical Activities, $\bar{X}$ = Arithmetic Mean, S.D. =Standard Deviation

Upon the evaluation of Table 3, it was determined that, by gender, there is not any meaningful difference between parent social support (t=2,218) and peer social support (t=1,900), and between SSSPA total mean (1,080) and happiness level (t=0,682), in statistical terms (p>,05).

Table 4. Comparison of Participants' Physical Activity Social Support Sub-Dimensions and Happiness Levels by Grade

Variables			Grade	N	$\overline{X}$	S.S.	t	p
SSSPA Sub-Dimensions	Parental Support	Social	Middle School	147	7,03	3,51	3,750	,000
			High School	313	5,63	3,84		
	Peer Support	Social	Middle School	147	8,71	3,51	2,968	,003
			High School	313	7,57	4,02		
SSSPA Total			Middle School	147	1,53	15,7	3,979	,000
			High School	313	1,28	13,1		
Happiness Scale			Middle School	147	3,04	,743	4,081	,000
			High School	313	2,68	,921		

*p<0,05 SSSPA = Social Support Scale for Physical Activities, $\overline{X}$ = Arithmetic Mean, S.D. =Standard Deviation

When Table 4 is examined, it can be seen that, by the grade, there is a meaningful difference between participants' perception of parent support (t=3,750; p<,05) and peer support (t=2,968; p<,05). Besides, it can be also noted that, by grade, there is a meaningful difference between SSSPA average (t=3,979; p<,05) and happiness level (t=4,081; p<,05) in statistical terms.

Table 5. Results of Correlation Analysis for Physical Activity Involvement Level of Participants, Sub-Dimensions of Social Support Scale for Physical Activities, and Internal Consistency Values

Variables		1	2	3	4	5
1 Physical Activity Involvement	R	1				
	P					
2 Parental social Support	R	,194**	1			
	P	,000				
3 Peer Social Support	R	,181**	,460**	1		
	P	,000	,000			
4 SSSPA Total	R	,221**	,840**	,868**	1	
	P	,000	,000	,000		
5 Happiness Scale	R	,103*	,269**	,224**	,291**	1
	P	,027	,000	,000	,000	
*p<.05; **p<.01				n=460		

*p<0,05 SSSPA = Social Support Scale for Physical Activities, $\overline{X}$ = Arithmetic Mean, S.D. =Standard Deviation

When Table 4 is examined, it can be seen that, by the grade, there is a meaningful difference between participants' perception of parent support (t=3,750; p<,05) and peer support (t=2,968; p<,05). Besides, it can be also noted that, by grade, there is a meaningful difference between SSSPA average (t=3,979; p<,05) and happiness level (t=4,081; p<,05) in statistical terms.

Table 6. Regression Analysis Results for the Effect of Physical Activity Social Support Sub-Dimensions and Physical Activity Involvement on Happiness

Dependent Variable: Happiness							
Variables(Constant)	B	Std. Error	B	t	p	Tolerance	VIF
	2,147	,171		12,563	,000		
Parental Social Support	,045	,012	,195	3,849	,000	,780	1,283
Peer Social Support	,156	,053	,147	2,916	,004	,785	1,274
Physical Activity Involvement	,081	,093	,040	,869	,386	,953	1,050
	F=15,410**, R2=,092, DzltR2=,086						
*p<.05; **p<.01					Method: Enter		

*p<0,05 SSSPA = Social Support Scale for Physical Activities, $\overline{X}$ = Arithmetic Mean, S.D. =Standard Deviation

In Table 6, linear regression analysis was utilized to determine the effect of parent and peer social support sub-dimensions on happiness. As a result of the analysis, it was discovered that physical activity social support sub-dimensions predict happiness variable around 9% (adj. R2=0,86). In other words, it was determined that the parent and peer social support variables have a statistically meaningful effect on the happiness level of the students ($p<0,05$). Also, it was found that the highest degree of effect on happiness level belongs to parent social support ($\beta=,195$, $p<0,05$) and it is followed by peer social support ($\beta=,147$, $p<0,01$) and physical activity involvement level ($\beta=,040$, $p<0,01$) variables.

Discussion, Conclusion and Recommendations

This part of the study consists of discussion, results, and recommendations about the relationship between social support perception in physical activities and the happiness level of middle school and high school students.

In the study, it was observed that there was no significant difference in the levels of social support and happiness in physical activities according to the gender variable of the participants (Table 3). When the literature was examined, there were similar results with the results of this research (Kemer and Atik, 2005; Çeçen, 2008; Henriksen et al., 2016; Turgut and Çapan, 2017; Aydın et al., 2017; İlhan and Taşkın, 2019; Çankaya and Meydan, 2018; Kasapoğlu and Kış, 2016; Katja et. al., 2002; Mahon and Yacheski, 2005; Dost, 2006; Cenkseven and Akbaş, 2007), and there were studies showing differences with the results of this research (Jackson and Warren, 2000; Demaray and Malecki, 2002; Malecki and Demaray, 2006; Kapıkıran and Özgüngör, 2009; Sezer, 2011; Huang and Humphreys, 2012; Alfalah and Alganem, 2020; Bingol and Bingol, 2020).

It can be seen that the level of parent support the middle school students receive from their parents is higher than that of high school students (Table 4). Based on this finding, it can be stated that social support level decreases while the grade increases. Some studies in the literature came up with similar results (Garcia et. al.,1998; Duncan et. al., 2005; Raudsepp, 2006; Yaycı, 2016). Contrary to the results of our study, some studies claim that social support level increases by grade (Hünük et. al., 2013). Furthermore, the relation between SSSPA total score and happiness level was analyzed, and statistically meaningful differences were determined. In the literature, some studies reached similar results (Gallagher and Vella-Brodrick, 2008; Siedlecki et. al., 2014; Kong et. al., 2020). Among middle school and high school students, the happiness level increases by the amount of perceived social support for physical activities.

The received social support level for physical activity involvement (parent and peer) is analyzed and a statistically meaningful positive relationship was determined (Table 5). When the

studies in the literature are scanned, similar to our findings, parent social support (Raudsepp, 2006; Dowda et. al., 2007; Beets et. al., 2010; Hsu et. al., 2011; İlhan and Taşkın, 2019) and peer social support (Voorhees et. al., 2005; Beets et. al., 2006; Salvy et. al., 2009) in physical activity involvement stand out as two significant influences. Many studies, which suggest that physical activity involvement inclination of adolescents increases by the amount of social support they receive, were discovered during literature review (Anderssen and Wold, 1992; Duncan et. al., 2005; Mendonça and Farias Júnior, 2015; Küçükibiş and Eskiler, 2019). On the other hand, studies which do not overlap with the results of our study, can also be encountered (Prochaska et. al., 2002; Higgins et. al., 2003; Frenn et. al., 2005; Ricardo et. al., 2013).

The relation between physical activity social support scale scores and sub-dimensions, and happiness levels for middle school and high school students are analyzed, and positive meaningful relation was determined (Table 5). Similar results were also found in the studies about social support and happiness, and wellness, which has conceptual relation to our subject (Schnittker, 2008; Edwards and Lopez, 2006; Horstmanshof et. al., 2008; Saygın and Arslan, 2009; Chu et. al., 2010; Lim et. al., 2015; Arslan, 2018; Boyacı, 2019) The positive outcome of the study can be supposed to have resulted from social support's evoking positive feelings and supporting the well-being of individuals. By this assumption, social support is suggested to be a significant need for individuals' well-being (Baumeister and Leary, 1995; Diener and Oishi, 2005; Diener and Seligman, 2002).

Regression analysis results for the relation between social support in physical activity involvement and happiness levels are analyzed and it was determined that the perceived social support level of students predicts the happiness variable around 0,9% (Table 6). It was also found that the social support the participant middle school and high school students receive from their parents and peers is a significant predictor of happiness variables. In other words, it can be seen in the analysis that, happiness level decreases when parent and peer social support decreases, and it increases when parent and peer social support increases. Wu and Liu (2005) studied the relationship between subjective happiness feelings of university students and social support and concluded that social support is a predictor variable of subjective happiness.

Suggestions

According to the results of our study, the recommendations for schools and future researchers are as follows;

• Middle and high school administrations should organize physical activities, or increase the amount of the activities, if they already have any, for the well-being of their students.

• School administrations should also reach out to parents and inform them about the significance of social support.

• Utilizing the results of quantitative studies, the effect of physical activity and social support in increasing the happiness level of individuals, should be examined within qualitative studies and from different perspectives.

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The Relationship Between Prospective Teachers' Digital Literacy Skills, Attitude Towards the Teaching Profession and Academic Motivations

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Abstract

Within a process, which is intricate and multifaceted, such as teacher training it is crucial that pre-service teachers are well informed and have high academic motivations as well as cultivating positive attitudes towards their profession. The purpose of this study is to determine the relationship among undergraduate students' academic motivations, their attitudes toward the teaching profession, and their digital literacy abilities. A quantitative correlational research design was employed. 493 teacher candidates participated in the study. Convenient sampling approach, one of the non-random sampling techniques, was utilized while choosing the sample group. The results of the data analysis revealed a favorable correlation among teacher candidates' attitudes toward the teaching profession, their academic motivation, and their levels of digital literacy. Taking precautions to assist teacher candidates' academic motivation, their levels of digital literacy, and their attitudes toward teaching is advised.

Keywords: Academic motivation, attitudes, teaching profession, digital literacy.

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Introduction

It is important that teachers, who are one of the important elements of the education system, are high quality, have improved morale and motivation, and keep themselves up to date. In other words, special attention should be paid to teachers, who are the most valuable parts of the system, and their attitudes and behaviors should be taken into account. Because these attitudes and behaviors affect students' participation and learning (Akkuş, Akkaş, & Yıldırım, 2018; Blazar & Kraft, 2017). Attitude is defined as an individual's reaction predisposition towards situations, events or things (Temizkan, 2008).

Attitude Towards The Teaching Profession

It is stated that some of the problems that teachers experience in teaching are related to enjoying teaching, respecting and internalizing their professions (Pehlivan, 2008; Tschannen-Moran, 2009). In other words, attitudes towards the teaching profession are among the factors that directly affect student achievement (Caprara, Barbaranelli, Steca, & Malone, 2006; Senel, Demir, Sertelin, Kilicaslan, & Koksal, 2004). When teachers' attitudes towards the profession are not positive, the learning climate will also be negatively affected (Küçük Kiliç, 2014; Malm, 2020). For this reason, in a complex and multifaceted process such as teacher training, it is important that teacher candidates develop positive attitudes towards their profession as well as being well-trained in field knowledge and professional knowledge (Chakraborty & Mondal, 2014; Temizkan, 2008). In the literature, it is stated that teacher candidates' attitudes towards the profession are high (Alkhateeb, 2013; Aydemir, 2021; Dağ, 2022; Güdek, 2007; Horvath, Goodell, & Kosteas, 2018; İlter, 2009; Kumar, 2016; Musa & Bichi, 2015; Özder, Konedralı, & Zeki, 2010) and low (Hussain, Ali, Khan, Ramzan, & Qadeer, 2011; Kahyaoğlu, Tan, & Kaya, 2013; Osunde & Izevbigie, 2006). It will be beneficial to continuously determine the attitudes towards the teaching profession, which can predict the in-service professional performance of teacher candidates.

Academic Motivation

Academic motivation is also an important variable within the scope of 21st century learner skills learning and innovation skills. Academic motivation is the energy required for academic work (Karataş & Erden, 2012). It can be said that this motivation affects the classroom behaviors and attitudes of learners at all levels of education (Gömleksiz & Serhatlıoğlu, 2014; Jiang, Rosenzweig, & Gaspard, 2018). Because there are many studies showing that high academic motivation positively affects course success (Çevik & Bakioğlu, 2021; Coetzee, 2011; Compeau & Higgins, 2020; Erfani, 2017; Higgins, Huscroft-D'Angelo, & Crawford, 2019; Htoo, 2014; Pirāni, Yārahmadi, Ahmadiān, & Pirāni, 2018; Titrek, Çetin, Kaymak, & Kasikçi, 2018; Tokan & Imakulata, 2019). Motivating learners in order to realize the achievements determined by the studies in question and to ensure

learning are among the important issues that school stakeholders should overcome (Karataş & Erden, 2012). Therefore it is important to investigate academic motivation at all levels of education and to take precautions as a result of these researches. For these reasons, it is thought that the current academic motivation levels of teacher candidates may also affect their success in their future professional lives. When the literature is scanned, it has been stated that working time, environment, social background, expectations and innovation are among the factors affecting academic motivation (Wilkesmann, Fischer, & Virgillito, 2012).

Digital Literacy

Today, the concept of digital literacy has emerged with the digitalization that has entered every field. Digital literacy, which is among the 21st century learner competencies, is the ability to use technology confidently, creatively and critically to fulfill the requirements of the learning and working process in a digital society (JISC, 2015). In her research, Arpa (2017) emphasized that it would not be possible to respond to today's social and individual needs if modern education policy, plans and programs do not benefit from technological opportunities, and stated that skills such as innovation, productivity, versatility, entrepreneurship and technology literacy should be included in education programs.

With the digitalized life, it has become a necessity for each individual to be digitally literate at a certain level. In other words, the 21st century learner is expected to be digitally literate within the scope of information, media and technology skills. In the same direction, teachers and prospective teachers need to develop their digital literacy levels in order to be successful in digitalized learning environments. With the COVID-19 pandemic, the importance of digital literacy has emerged more. Because lessons had to be held remotely during the pandemic period, and both teachers and students had difficulties using digital tools (Al Salman, Alkathiri, & Khaled Bawaneh, 2021; El Refae, Kaba, & Eletter, 2021; Kaya, 2020). another indicator is the large number of studies (Oh et al., 2021; Reddy, Sharma, & Chaudhary, 2020). For example, basic education programs (Altun & Alpan, 2021), social studies curriculum (Direkçi, Akbulut, & Şimşek, 2019), Information technologies and software curriculum (Elçi & Mediha, 2015) and Turkish curriculum (Direkçi et al., 2019; Duran & Özen, 2018; Özbay & Özdemir, 2014) were examined in the context of digital literacy. In addition, there are studies (Doğan & Demirkan, 2020; Kozan, 2018a; Kuru, 2019; Onursoy, 2018; Yaman, 2019) in which the digital literacy levels of university students are determined.

In this study, digital literacy levels, attitudes towards the teaching profession and academic motivation levels of teacher candidates, which are among the important skills that teacher candidates have today, were examined. It is expected that the high level of digital literacy of teacher candidates will positively affect their academic motivation and attitudes towards the teaching profession. It is observed that the variables mentioned in the literature are being researched. However, no study was

found that examined the relationship among these variables. In addition, it is also important to carry out up-to-date studies that measure the attitudes, digital literacy levels and academic motivations of teacher candidates towards the teaching profession. In this context, it is thought that it can contribute to the field. The purpose of this study is to determine the relationship between undergraduate students' academic motivations, their attitudes toward the teaching profession, and their digital literacy abilities.

In order to reach this purpose the following research questions are asked:

1. What are the attitudes of undergraduate students towards the teaching profession?

2. What is the academic motivation level of undergraduate students?

3. What is the digital literacy skills level of undergraduate students?

4. Is there a significant relationship between their attitudes towards the teaching profession, their academic motivation and their digital literacy skills and the gender of undergraduate students?

5. Is there a significant relationship between their attitudes towards the teaching profession, their academic motivation and their digital literacy skills and the department in which undergraduate students study?

6. Is there a significant relationship between their attitudes towards the teaching profession, their academic motivation and their digital literacy skills and the grade levels of undergraduate students?

7. Is there a significant relationship among undergraduate students' attitudes towards the teaching profession, academic motivation and digital literacy skills?

Method

Research Model

Quantitative correlational research design was used in this study, which aims to determine the relationship among undergraduate students' attitudes towards the teaching profession, their academic motivations and their digital literacy skills.

Sample

The sample of the study consisted of 493 teacher candidates studying at a state university in the 2021-2022 academic year. While determining the sample group, convenient sampling method, which is one of the non-random sampling methods, was used. This sampling method refers to the collection of data from a sample that is easily accessible for the researcher (Büyüköztürk et al. 2017). When the demographic characteristics of the teacher candidates included in the research are examined; 78.1% of the teacher candidates were female and 21.9% male; 12.8% Science Education,

13.6% Classroom Education 1.2% English Education, 15.4% Social Studies Education, 18.7% Preschool Education 8.3% Mathematics Education, 5.3% Biology Education, % 14.0% of them studied in Psychological Counseling and Guidance, 8.1% in Turkish Education, 2.6% in Music Education; It was determined that 8.5% of them were in their 1st year, 36.3% in their 2nd year, 9.7% in their 3rd year and 45.4% in their 4th year.

Data Collection Tools

In order to determine the relationship among undergraduate students' attitudes towards the teaching profession, their academic motivation and their digital literacy skills, the attitude scale towards the teaching profession developed by Kahramanoğlu (2018), the academic motivation scale developed by Karagüven, (2012) and digital literacy scales were used developed by Üstündağ, Güneş, and Bahçıvan, (2017).

Attitude Scale Towards Teaching Profession

The Attitude Scale towards Teaching Profession, developed by Kahramanoğlu (2018) and aiming to determine the attitudes of undergraduate students towards the teaching profession, is a 5-point Likert scale and consists of one dimension and 12 items. As a result of exploratory factor analysis; Cronbach Alpha reliability coefficient of the scale was .93; KMO value is .832; Bartlett test 593,874; df: 66 and p= .000. When the results of the confirmatory factor analysis (CFA) conducted to test the construct validity of the "Attitude towards Teaching Profession Scale" are examined, it is observed that the Chi-square fit index (X2 = 45.131, df= 34, X2/df = 1.33) is significant. Looking at the other fit index values, it was found that RMSEA= .06, RMR= .04, CFI=.98, NFI= .93, GFI= .91 and AGFI= .79. When the results of the model are evaluated in general, it is observed that the model has a good fit.

Academic Motivation Scale

The Academic Motivation Scale, which was developed by Karagüven (2012) aims to determine the academic motivation levels of teacher candidates, and is a 7-point Likert type and consists of one dimension and 10 items. As a result of exploratory factor analysis; Cronbach Alpha reliability coefficient of the scale was .94; KMO value of .860; Bartlett test 1739,993; df: 378 and p= .000. The Cronbach Alpha reliability coefficients of the scale according to the sub-dimensions are presented in Table 1.

Table 1. Cronbach Alpha Values of the Sub-Dimensions of the Academic Motivation Scale

		Dimensions	Cronbach Alpha
Academic Motivation Scale		Intrinsic motivation to know	.84
		Intrinsic motivation for success	.90
		Intrinsic motivation to experience stimulation	.84
		Identified extrinsic motivation	.77
		Introjected extrinsic motivation	.90
		Extrinsic motivation - external regulation	.80
		lack of motivation	.89

When the results of the confirmatory factor analysis (CFA) performed to test the construct validity of the "Academic Motivation Scale" are examined, it is observed that the Chi-square fit index (X2 = 283.225, df= 216, X2/df = 1.311) is significant. Looking at the other fit index values, it was found that RMSEA= .03, RMR= .07, CFI=.99, NFI= .96, GFI= .96 and AGFI= .93. When the results of the model are evaluated in general, it is observed that the model has a good fit.

Digital Literacy Scale

The Digital Literacy Scale, developed by Üstündağ, Güneş, and Bahçıvan, (2017) aiming to determine the digital literacy skills of teacher candidates, is a 5-point likert type and consists of one dimension and 10 items. As a result of exploratory factor analysis; Cronbach Alpha reliability coefficient of the scale was .93; KMO value is .909; Bartlett test 454,860; df: 45 and p= .000. When the results of the confirmatory factor analysis (CFA) performed to test the construct validity of the "Digital Literacy Scale" are examined, it is observed that the Chi-square fit index (X2 = 33.369, df= 30, X2/df = 1.112) is significant. Looking at the other fit index values, it was found that RMSEA= .04, RMR= .04, CFI=.99, NFI= .94, GFI= .91 and AGFI= .84. When the results of the model are evaluated in general, it is observed that the model has a good fit.

Analysis of Data

The Kolmogorov-Smirnov and Shapiro-Wilk Tests are used to observe whether the data obtained from the Attitudes towards Teaching Profession Scale, Academic Motivation Scale and Digital Literacy Scale showed normal distribution. When the Skewness and Kurtosis values are examined, it is observed that the data obtained from the scales were normally distributed. For this reason, descriptive statistics regarding the variables in the research; T-test, One-factor Analysis of Variance (ANOVA) and structural equation modeling were used.

Results

In the first sub-problem of the research, the answers given by the undergraduate students to the attitude scale towards the teaching profession were analyzed and the results are presented in Table 2.

Table 2. Mean and standard deviations related to the scale of attitude towards the teaching profession

	n	$\bar{x}$	s
Attitude Scale Towards Teaching Profession	493	4.36	.48

As a result of the analysis of the data obtained from the Attitude Scale towards Teaching Profession in Table 2, it is observed that the attitudes of undergraduate students towards the teaching profession are at a very high level ($\bar{x}$= 4.36, s= .48).

In the second sub-problem of the research, the answers given by the undergraduate students to the academic motivation scale were analyzed and the results are presented in Table 3.

Table 3. Mean and standard deviations of the academic motivation scale

Dimensions	n	$\bar{x}$	s
Intrinsic motivation to know	493	5.85	1.00
Intrinsic motivation for success	493	5.51	1.13
Intrinsic motivation to experience stimulation	493	5.16	1.21
Identified extrinsic motivation	493	5.88	.97
Introjected extrinsic motivation	493	5.03	1.34
Extrinsic motivation - external regulation	493	5.22	1.17
Lack of motivation	493	2.07	1.34
General	493	4.97	.72

When the data obtained from Table 3 are examined, it is observed that the academic motivation of undergraduate students ($\bar{x}$= 4.97, s=.72) is at a high level. When the perceptions of undergraduate students about the dimensions that constitute academic motivation are examined; Determined extrinsic motivation ($\bar{x}$= 5.88, s=.97), intrinsic motivation to know ($\bar{x}$= 5.85, s= 1.00) and intrinsic motivation to success ($\bar{x}$= 5.51, s= 1.13) levels were very high; Extrinsic motivation - extrinsic regulation ($\bar{x}$= 5.22, n= 1.17), intrinsic motivation to experience stimulation ($\bar{x}$= 5.03, s= 1.34) and Introjected extrinsic motivation ($\bar{x}$= 5.16, s= 1.21); It was concluded that the level of amotivation ($\bar{x}$= 2.07, s=. 72) was also low.

In the third sub-problem of the study, the answers given by the undergraduate students to the digital literacy scale were analyzed and the results are presented in Table 4.

Table 4. Mean and standard deviations of the digital literacy scale

	n	$\bar{x}$	s
Digital Literacy Scale	493	3.57	.61

As a result of the analysis of the data obtained from the digital literacy scale in Table 4, it is observed that the digital literacy skills of the undergraduate students are at a very high level ($\bar{x}$= 3.36, s= .61).

In the fourth sub-problem of the study, whether the undergraduate students' attitudes towards the teaching profession, their academic motivations and digital literacy skills differ according to the gender variable was examined with the T-Test, and the results are presented in Table 5.

Table 5. T-test results to determine the differences in undergraduate students' attitudes towards the teaching profession, their academic motivation and digital literacy skills according to the gender variable

	Gender	n	x	Sd	*t*	df	*p*
Attitude towards the teaching profession	Female	385	4.42	.46	3.864	491	.00
	Male	108	4.14	.51			
academic motivation	Female	385	4.98	.74	.762	491	.44
	Male	108	4.92	.67			
digital literacy	Female	385	3.53	.60	.816	491	.00
	Male	108	3.72	.64			

When the data obtained from Table 5 are examined, it is observed that there is a significant difference between undergraduate students' attitudes towards the teaching profession (t= 3.864; p = .00) and digital literacy skills (t= .816; p = .00) and gender. It was concluded that there was no significant difference between the academic motivations of undergraduate students (t= .762; p > .44) and their genders. The significant difference in the attitudes and academic motivations of undergraduate students towards the teaching profession is in favor of female students; It is observed that the significant difference in digital literacy skills is in favor of male teachers.

In the fifth sub-problem of the study, whether the attitudes, academic motivations and digital literacy skills of undergraduate students towards the teaching profession differ according to the variable of the department they studied was examined with the One-Way ANOVA test and the results are presented in Table 6.

Table 6. One-Way ANOVA results to determine the differences in undergraduate students' attitudes towards the teaching profession, academic motivation and digital literacy skills according to department

	Department	n	*x*	S	F	p	Significance
Attitude towards the teaching profession	1-Science Education	63	4.28	.55	*2.715*	.00	2-8
	2-Class Education	67	4.54	.41			
	3-English Education	6	4.31	.47			
	4-Social Studies Education	76	4.32	.49			
	5-Preschool Education	92	4.37	.48			
	6-Mathematics Education	41	4.45	.49			
	7-Biology Education	26	4.40	.35			
	8-Psychological Counseling and Guidance	69	4.18	.51			
	9-Turkish Education	40	4.44	.38			
	10-Music Education	13	4.26	.51			

academic motivation	1-Science Education	63	5.47	.73	*1.845*	.05	7-9
	2-Class Education	67	5.59	.77			
	3-English Education	6	6.04	.35			
	4-Social Studies Education	76	5.62	.78			
	5-Preschool Education	92	5.49	.94			
	6-Mathematics Education	41	5.93	.74			
	7-Biology Education	26	5.58	.76			
	8-Psychological Counseling and Guidance	69	5.28	.70			
	9-Turkish Education	40	5.68	.68			
	10-Music Education	13	5.71	.81			
digital literacy	1-Science Education	63	5.47	.73	*1.845*	.05	6-7
	2-Class Education	67	5.59	*.77*			
	3-English Education	6	6.04	*.35*			
	4-Social Studies Education	76	5.62	*.78*			
	5-Preschool Education	92	5.49	*.94*			
	6-Mathematics Education	41	5.28	*.70*			
	7-Biology Education	26	5.93	*.74*			
	8-Psychological Counseling and Guidance	69	5.58	*.76*			
	9-Turkish Education	40	5.68	*.68*			
	10-Music Education	13	5.71	*.81*			

When the data obtained from Table 6 are examined, undergraduate students' attitudes towards the teaching profession (F= 2.718; $p < .05$), academic motivations (F= 1.845; $p < .05$), and digital literacy skills (F= 1.845; $p \leq .05$) It is observed that there is a significant difference between) and the variable of the department they studied. According to the Tukey Test, which was conducted to determine between which groups the difference in the attitudes of undergraduate students towards the teaching profession, it was concluded that the significant difference between classroom education and psychological counseling and guidance departments was in favor of classroom education students. According to the Tukey Test, which was conducted to determine between which groups the difference in undergraduate students' academic motivations was, it was concluded that the significant difference between biology education and Turkish education departments was in favor of Turkish education students. It was concluded that the significant difference between the mathematics education and biology education departments according to the Tukey Test conducted to determine whether there was a difference between the groups was in favor of the Biology Education students.

In the sixth sub-problem of the study, whether the undergraduate students' attitudes towards the teaching profession, their academic motivations and digital literacy skills differ according to their grade levels was examined with the One-Way ANOVA test, and the results are presented in Table 7.

Table 7. One-Way ANOVA results to determine the differences in undergraduate students' attitudes towards the teaching profession, academic motivation and digital literacy skills according to the grade level variable

	Grade level	n	*x*	S	F	p	Significance
Attitude towards the teaching profession	1st Class	42	4.28	.46	*2.834*	.03	3-2 4-2
	2. Class	179	4.29	.50			
	3rd Class	48	4.45	.44			
	4th grade	224	4.41	.48			
academic motivation	1st Class	42	5.62	.73	*.125*	.94	-
	2. Class	179	5.57	*.80*			
	3rd Class	48	5.51	*.88*			
	4th grade	224	5.57	*.78*			
digital literacy	1st Class	42	3.29	.55	*8.565*	.00	3-1 4-1 4-2
	2. Class	179	3.46	.62			
	3rd Class	48	3.68	.56			
	4th grade	224	3.69	.60			

When the data obtained from Table 7 are examined, it is observed that there is a significant difference between undergraduate students' attitudes towards the teaching profession (F= 2.834; p < .05) and digital literacy skills (F= 8.565; p <.05) and grade level variable; It is observed that there is no significant difference according to academic motivation (F= .374; p > .05) and grade level variable. According to the Tukey Test, which was conducted to determine between which groups the difference in the attitudes of undergraduate students towards the teaching profession, it was concluded that the significant difference between the third and second grades was in favor of the third grades, and between the fourth grades and the second grades in favor of the fourth graders. When the results are examined in terms of digital literacy skills, it is concluded that the significant difference between the third grades and first grades in favor of the third graders, and between the fourth grades and the first and second grades in favor of the fourth graders, according to the Tukey Test conducted to determine among which groups the difference in digital literacy skills of undergraduate students.

In the last problem of the study, the relationship among undergraduate students' attitudes towards the teaching profession, their academic motivation and digital literacy skills were examined with the structural equation model and the path diagram for the model is shown in Figure 1.

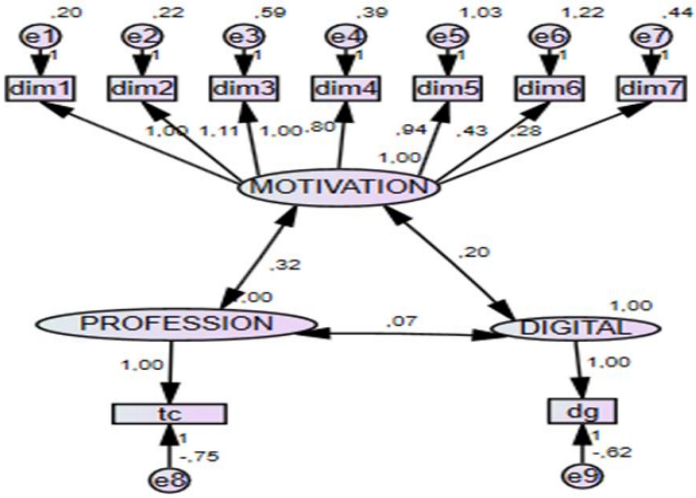

Figure 1. Structural equation model in which there is a reciprocal relationship between undergraduate students' attitudes towards the teaching profession, their academic motivation and digital literacy skills

When the model in Figure 1 is examined, it is observed that there was a low level and positive relationship between undergraduate students' attitudes towards the teaching profession and their academic motivation (γ= .32); It was concluded that there is a low and positive relationship between digital literacy skills and academic motivation (γ= .20), and a low level and positive relationship between attitudes towards the teaching profession and digital literacy skills (γ= .07).

The structural model values of undergraduate students' attitudes towards the teaching profession, academic motivation and digital literacy skills are shown in Table 8.

Table 8. Structural model values of undergraduate students' attitudes towards the teaching profession, academic motivation and digital literacy skills

	X^2	df	X^2/df	RMR	RMSEA	CFI	GFI	AGFI	NFI
Structural Equation Modeling	100.961	21	4.81	.08	0.08	0.97	0.96	0.91	0.96

According to the path analysis results of the conceptual model in Table 8, the Chi-square fit index of the model (X2= 100.961, df= 21, X2/df= 4.81) was determined to be significant. Other fit indices were found to be RMSEA= .08, CFI= .97, NFI= .95, RMR= .08, GFI= .96, and AGFI= .91. It is observed that the model is at an acceptable level in terms of fit values

Conclusion

In this study, it was aimed to determine the digital literacy levels of teacher candidates, their attitudes towards the teaching profession and their academic motivation levels and the level of relationship among these variables. In the first sub-problem of the study, the attitudes of

undergraduate students towards the teaching profession were determined. Considering the findings of our study, the attitudes of teacher candidates towards the teaching profession are quite high. Accordingly, it can be said that teachers' high attitudes will positively affect success and satisfaction in their professional life. Manuel and Hughes (2006) state that students' choosing the teaching profession means fulfilling their inner self and desires, taking responsibility in a field they want, and working with young people, which is a large social project in the field of education. It can be said that pre-service teachers with positive attitudes will do their jobs willingly and lovingly in the future, and as a result, they will make significant contributions to education. It is very important to do this profession lovingly and willingly in order to be successful in the teaching profession, which requires lifelong learning, patience and dedication. There are studies supporting this result obtained from the research (Ayık & Ataş, 2014; Kocaer, 2019; Pehlivan, 2008; Temizkan, 2008). In some studies, it has been stated that the attitudes of teacher candidates towards the teaching profession are at a low level and the reason for this is that teacher candidates prefer the profession without knowing the profession or they may be reluctant towards the teaching profession (Kahyaoğlu et al., 2013).

According to the second finding of our study, it is observed that the academic motivation of the undergraduate students was at a very high level. Many studies in the literature have revealed that there is a positive relationship between motivation and academic achievement. In other words, motivation is an important element in increasing the academic performance of students (Vanthournout, Gijbels, Coertjens, Donche, & Van Petegem, 2012). In this sense, the high academic motivation of teacher candidates can be regarded as positive. There are studies in the literature that overlap with this result (Alemdağ, Erman, & Yılmaz, 2014; Amrai, Motlagh, Zalani, & Parhon, 2011; Temizsiz & Serhatlıoğlu, 2014; Özen, 2019; Yurtsever & Dulay, 2022). It can be seen that they accept the opinions about the sub-dimension at a low level. On the other hand, it is observed that the views on intrinsic motivations for knowing, success oriented and adapting, determined extrinsic motivation, introverted extrinsic motivation and extrinsic motivation-external regulation dimensions are at a high level.

According to the findings, it was revealed that the level of digital literacy skills of teacher candidates is high. This may be due to the fact that today's learners frequently experience technological changes and use technological tools intensively in their daily lives. It can be said that this situation is positive for future teachers to be ready for learning environments compatible with digital life. Having a high level of digital literacy can also increase the potential of teachers to improve themselves (Svensson & Baelo, 2015). Recent studies (Akman, 2021; İşişoğlu & Kocakuşak, 2012; G. Karakuş & Gürbüz, 2019; Kozan, 2018b; Talan & Aktürk, 2021) seem to support this finding and interpretation. Considering that digital literacy plays an important role in the acceptance of online learning (Mohammadyari & Singh, 2015), it can be said that digital literacy should be

included in the education programs of faculties since the concept of digital citizen has emerged in the digital age. Digital citizenship is a word that refers to the amount of education and skills required to participate actively in social, professional, and civic life (Milenkova & Lendzhova, 2021). However, there are also studies in which the level of digital literacy is determined as intermediate (Yontar, 2019).

When the attitudes of teacher candidates towards the teaching profession change according to gender, it is observed that the average of female students is higher. There are studies that overlap with this result (Chakraborty & Mondal, 2014; C. İpek, Kahveci, & Camadan, 2015; Maliki, 2013; Pehlivan, 2008; Terzi & Tezci, 2007). This situation can be explained by the thought that the teaching profession is among the ideal professions for women (Çeliköz & Çetin, 2004; Pehlivan, 2008). In addition, there are studies in which the attitude towards the teaching profession does not differ according to gender (Uygun & Avarogullari, 2020).

It is observed that the academic motivations of teacher candidates differed significantly in favor of women according to gender. In addition, it is observed that male teacher candidates' motivation levels were higher than female teacher candidates. Studies supporting these results have been done (Akbaşlı, Kubilay, & Durnalı, 2017; Brouse, Basch, LeBlanc, McKnight, & Lei, 2010; Eymur & Geban, 2011; Kırmızısiz & Serhatlıoğlu, 2014; Özen, 2019; Roohi & Asayesh, 2012; Tunç, Çiftçi, & Dal, 2018). On the other hand, there are studies (Tuncer, Yelken, & Tanrıseven, 2018; Zembat, Akşın-Yavuz, Tunçeli, & Yılmaz, 2018) in which the academic motivations of teacher candidates do not differ according to gender.

It is observed that the digital literacy levels of teacher candidates differed significantly according to gender. In other words, the digital literacy levels of teacher candidates vary according to their gender. We can see that the relevant change is in favor of men. There are studies supporting this result (Korkmaz, 2020; Öteles, 2020; Özerbaş & Kuralbayeva, 2018; Sarikaya, 2019; Timur, Timur, & Akkoyunlu, 2014; Yeşildal, 2018). In some studies (Dedebali, 2020; Erol & Aydın, 2021; G. Karakuş & Gürbüz, 2019; Kazu & Erten, 2014; Kozan, 2018b; Yaman, 2019; Yontar, 2019) it was stated that there was no significant difference. The concept of technological gender gap regarding individuals' technology use can explain this situation (DuBow & Pruitt, 2019). In the literature, it has been stated that men are more prone to use technology than women.

It is observed that the attitudes of teacher candidates towards the teaching profession change according to the department they study. There are studies supporting this result in the literature (Kayhan, Baysan, & Alcı, 2018; Kocaarslan, 2014; Özgenel & Deniz, 2020). It has been determined that the pre-service teachers studying in classroom education have the highest average. Kocaarslan (2014) found similar results in his study. In addition, a significant difference was found between the

attitudes of prospective teachers of classroom teaching and Psychological Counseling and Guidance education. In other words, it can be said that the students in the classroom teaching program have a more positive attitude towards the teaching profession than the students in the psychological counseling and guidance program. In another study, Kayhan, Baysan, & Alcı(2018) stated that pre-school teacher candidates had a higher average. The different results obtained from different departments may be due to the differences in the faculty members of the departments and the universities where the students study. Contrary to these results, there are also studies (Uygun & Avarogullari, 2020) in which attitudes towards the teaching profession do not differ significantly according to the department of education.

It was found that the academic motivation levels of teacher candidates differed significantly according to the department they studied. Keskinsiz & Serhatlıoğlu (2014) and Korkmazer (2020) encountered the same results in their studies. It is observed that the highest average was in English and mathematics education departments. In addition, the academic motivation levels of Turkish education teacher candidates differed significantly compared to biology education teacher candidates. We can attribute this situation to the differences in university entrance scores between departments or to the opportunities to find a job after graduation. There are also studies in which academic motivation does not differ significantly between departments (Akyürek, 2020; Özgenel & Deniz, 2020).

When the digital literacy levels of teacher candidates were examined according to the department they studied, it was determined that there was a significant difference. It is observed that the department with the highest average was the department of English education. In addition, it was determined that there was a significant difference between pre-service mathematics and biology education teachers. There are studies (G. Karakuş & Gürbüz, 2019) that overlap with this result. In the literature, it shows that in terms of technology competencies, teacher candidates are at different levels according to their departments (Çetin, Çalışkan, & Menzi, 2012). It can be said that this differentiation in technological competencies is reflected in digital literacy. In our study, this difference was in favor of biology education teacher candidates.

It is observed that the attitudes of teacher candidates towards the teaching profession differ significantly according to the class variable. Erbaş (2021), Karakuş (2017), Zembat, Hilal, & Küsmüş (2019), Çapa&Çil (2000) and Göktaş (2017) reached the same conclusion in their studies. In our study, it is observed that the attitudes of the teacher candidates in the upper class towards the teaching profession differed significantly compared to the prospective teachers in the lower class. It is thought that this situation may be related to the upcoming teaching exams and graduation. In addition, it can be said that the departments they study have positively affected the attitude towards the teaching

profession over the years. However, Atalmış & Köse (2018), Pehlivan (2008), Gökçe & Sezer (2012) and Kocaer (2019) stated in their study that the grade level variable did not make a significant difference.

It was determined that the academic motivation of the teacher candidates was higher than the grade levels, but they did not make a significant difference. There are studies similar to this result (Aktaş, 2017; Özbek, 2019; Özgenel & Deniz, 2020; Yavuz Eroğlu, Eroğlu, & Ekinci, 2019). This positively interpreted situation shows that teacher candidates have good academic motivation. There are studies in the literature (Akyürek, 2020; Avcı, Kula, & Haşlaman, 2019; Çetinel & Gürcüoğlu, 2022; Taşkın, 2015) which contradicts with this result. In these studies, it was stated that the academic motivation levels of senior students were generally lower.

The digital literacy levels of teacher candidates has been examined in terms of class variable and it is observed that there was a significant difference. According to the results, it is observed that the digital literacy levels of the teacher candidates studying in the upper class differed significantly compared to the candidates in the lower class. We can attribute this situation to the knowledge, experience and life that increases as the grade level progresses. There are studies supporting this result (Kozan, 2018b; Özerbaş & Kuralbayeva, 2018; Yaman, 2019). However, there are also studies (Aslan, 2021; Yontar, 2019) stating that the level of digital literacy does not differ according to the grade level.

The relationship between pre-service teachers' attitudes towards the teaching profession, academic motivation and digital literacy skills was examined. Accordingly, a low level of positive correlation was found between the attitude towards the teaching profession and academic motivation. In other words, it is expected that teacher candidates who have high academic attitudes will also have high attitudes towards the teaching profession. This result was found in Çeliköz & Çetin, (2004) and Zembat et al. (2018) are similar to the results of their studies. However, İpek&Camadan (2012) and Bedel(2016) stated in their studies that there is no relationship between these two variables. A low level of positive correlation was found between the digital literacy level of teacher candidates and their academic motivation. In other words, it is predicted that the academic motivation of the candidates with a high level of digital literacy is also high. There are studies supporting this result in the literature (Akman, 2021; Wong, Ho, Chen, Gu, & Zeng, 2015). It is natural to obtain this result because there is a relationship between digital competence and academic motivation (Hatlevik & Christophersen, 2013). When we look at the attitude towards the teaching profession and the level of digital literacy, a low and positive relationship was found again. It is stated that when the pre-service teachers' perceptions of technology use proficiency are high, their attitudes towards the teaching

profession are also high (Usta & Korkmaz, 2010). As a result of these findings, the following recommendations were made.

For teacher candidates;

1. Taking measures to increase the academic motivation of teacher candidates in adopting their profession,

2. Gaining digital literacy skills in order to support the academic motivation of teacher candidates,

3. Taking measures to increase the digital literacy levels of future teachers,

4. Providing support for teacher candidates in accessing internet resources and digital devices,

For researchers;

1. Increasing the number of studies investigating these variables,

2. Reaching more detailed results with mixed methods in future studies,

3. It is recommended that the research be applied to different samples as well.

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A Structural Model of Marriage Adjustment for Married Individuals

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Abstract

The aim of this research is to test a structural model for married individuals. 215 Turkish married individuals [Age_{range} = 24-56, Age_{Mean} =35.24, Age_{Sd} = 7.44] determined by using the maximum diversity sampling method, one of the purposeful sampling methods, participated in the research. Data were collected with Scale of Meaning of Marriage (SMM), Marital Satisfaction Scale (MSS) and Marital Adjustment Test (MAT). Data were analysed with Two-Stage Structural Equation Modeling. A bootstrap analysis was performed for the significance of indirect effects. As a result of the analyses, the tested structural model was confirmed and it was determined that marital satisfaction had a full mediator effect between the meaning attributed to marriage and marital adjustment of married individuals.

Keywords: Marriage, marital satisfaction, marital adjustment, meaning of marriage.

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Introduction

Close relationships have three stages: initiation, maintenance and termination (Eryılmaz & Atak, 2011). On the initiation phase researches (Eryılmaz & Atak, 2009; Eryılmaz & Doğan, 2013), the indicators of initiating romantic intimacy have been determined. However, the maintenance phase is an important phase in intimacy relationships. The concepts of marital satisfaction, marital adjustment and meaning of marriage in the present study constitute the essence of the maintenance phase (Özbek, 2018).

Marriage is a social system that has an important place throughout human history and constitutes the basic structure of societies. According to Gittins (1985), marriage is expressed as a special love relationship that includes sexual satisfaction established between men and women to meet mutual needs. Güner (2014), on the other hand, defined marriage as an emotional and social bond that includes the social rules realized by two individuals of the opposite sex within the framework of the rights determined by the law. Marriage has a unique place in every society and it has a responsibility that affects the society as well as being affected by it (Burç, 2018). What shapes this responsibility is the physical, social and emotional needs of married individuals (Özaydınlık, 2014). Married individuals shape their responsibilities as they begin to realize each other's needs over time. As a matter of fact, this process brings with it marital adjustment.

Marriage adjustment is defined as the situation in which there is a sense of pleasure and contentment between spouses regarding marriage (Hashmi, Khurshid, & Hassan, 2007). Marital adjustment describes a married couple's experience of adjusting to the marital relationship. Newlyweds enter a period of marital adjustment as both spouses get to know each other. In this sense, marital adjustment is the adjustment of each spouse to their new role and responsibilities as husband and wife. Individuals who have a harmonious marriage are in a positive communication cycle and can cope with the problems they face with cooperative solution methods (Tutarel Kışlak & Çabukça, 2002). According to Kaye, Nick, and James (1977), the ability of two married individuals to get along harmoniously differs according to the expectations they form about marriage. In this sense, individuals get married with the hope and belief of making both themselves and their partner happy (Güler, 2021). The beliefs and expectations about marriage also constitute the meaning attributed to marriage (Mohammadi & Soleymani, 2017).

Determining the components of the meaning attributed to marriage is to reveal how marriage is perceived socially and individually. Although marriage has culturally different meanings, it also includes universal aspects such as love, affection, intimacy and generational continuity (Canel, 2012). Marriage is an institution that is traditionally considered virtuous and has spiritual dimensions. However, social changes and developments in the last century have also differentiated the roles of men and women (Çelik & Erkilet, 2019). Demographic and social changes have also shaped the

meaning, attitudes and beliefs that young adults ascribe to marriage when evaluated from the aspect of marriage (Peters, 2018).

The existence of unrealistic expectations on marriage is also a factor that will trigger the marriage to fail. It has been observed that individuals who create constructive images of marriage have higher marital satisfaction (Jones & Nelson, 1996). In addition, it has been determined that the marital satisfaction of individuals who think that their expectations from marriage are met (Johnson, 2015). In this sense, over the years, it has become important to meet the expectations and needs of married individuals from marriage. A harmonious marriage; it can facilitate the partners to lead a better quality life in terms of mutual psychological, economic and social support (Çağ & Yıldırım, 2013). Therefore, one of the parts of a harmonious marriage is the satisfaction of marriage.

Marriage satisfaction is the psychological satisfaction that creates universal expectations such as gain, justice, equality and sharing problems, as well as personal desires such as love, attachment, trust, sexual satisfaction obtained from marriage (Sokolsi & Hendrick, 1999). "Marriage adjustment" is often used interchangeably with "marriage satisfaction", but the concepts differ. Marriage satisfaction is based on attitude and is therefore different for each spouse. Harmony defines each partner's commitment to marriage and friendship. In general, the spouses' high marital satisfaction is a characteristic of harmonious marriages (Spanier & Cole, 1976). Agreement on important matters is vital to harmonious marriages, so these marriages are characterized by love displayed through behavior and the calm resolution of conflicts (Kendrick & Drentea, 2016).

In the literature, it has been observed that there are positive relationships between marital satisfaction and marital adjustment (Özbek, 2018; Yaşar, 2009; Yılmaz, 2001). Since marital adjustment includes satisfaction and happiness in marital life, it is seen that there is a relationship with satisfaction. According to Huston et al. (2001) it was stated that couples who are satisfied with marriage are connected to each other, have a sense of trust and emotional intimacy, but couples who are not satisfied with marriage are in conflict. As a result, based on the above information, it can be said that marital satisfaction and marital adjustment are related concepts.

Marital adjustment has become more important with the increase in domestic violence and divorce rates today (Güngör & İlhan, 2008). Hawkins and Booth (2005) determined that individuals with unhappy marriages also have low general health status and show more signs of psychological discomfort. On the other hand, it has been observed that individuals in harmonious marriages have high social, physical and emotional well-being (Duman, 2012), and life satisfaction is high (Akhani et al. 1999; Zehir, 2016). Also, according to Kublay (2013), marital adjustment is positively related to subjective happiness. The increase in marital adjustment of married individuals shows that they experience positive emotions more. In addition to these, it is emphasized that marital relationships are an important source of happiness for adults (Eryılmaz, 2011; Eryılmaz & Doğan, 2013). In this sense,

it is thought that it will be important to include studies that will increase the marital adjustment of married individuals in the literature. As a result of the researches, the concepts of marital adjustment, meaning attributed to marriage and marital satisfaction are both theoretical (Blumer, 1969; Spainer, 1976; Sternberg, 1987) and empirical (Çağ & Yıldırım, 2013; Güler, 2021; Güner, 2014; Johnson, 2015; Mohammedi & Soleymani, 2017; Yaşar, 2019) but no model was found to show the structural relationships between each other. In addition, it is extremely important to reveal the protective arguments that affect the marital adjustment of married individuals in the research. Because determining the factors that will contribute to the marital adjustment of married individuals can encourage them to raise awareness about how valuable and important the family institution is, to make the meanings they attribute to marriage positive, and to discover the means of getting satisfaction from their marital life. This may make it easier for married individuals to be more compatible with their marital life. In summary, this positive effect can be considered as a remarkable output both individually and socially. In addition to these, Marriage requires knowledge. For this, it is important for couples to be conscious about taking precautions against problems that may occur in marriage. At this point, social awareness should be aimed, not on individual. In this direction, education policies to be made at the level of the ministry of family and social services are needed in the establishment and harmonious maintenance of healthy marriages. It is thought that the findings and theoretical information in this research will be a guide for the aforementioned need. In conclusion, the aim of this research is to test a structural model for married individuals. For this aim, hypotheses were determined:

H^1: Positive meaning of marriage significantly and positively predicts marital satisfaction.

H^2: Marriage satisfaction significantly and positively predicts marital adjustment.

H^3: Positive meaning of marriage significantly and positively predicts marital adjustment.

H^4: The mediating effect of marital satisfaction in the relationship between the positive meaning of marriage and marital adjustment is significant.

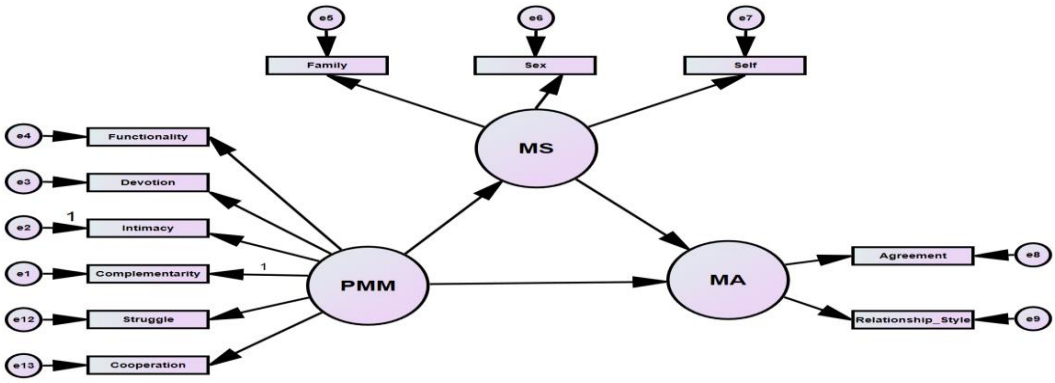

Figure 1. Hypothetical structural model

Note. PMM: Positive Meaning of Marriage, MS: Marital Satisfaction, MA: Marital Adjustment.

Method

Participants

215 Turkish married individuals [Age_{range} = 24-56, Age_{Mean} =35.24, Age_{Sd} = 7.44] determined by using the maximum diversity sampling method, one of the purposeful sampling methods, participated in the research. While creating this sample number, the formula used in structural equation modeling studies was applied. This formula is: (N: q; 10: 1) = N=Sample size: q= Number of parameters in the model (Jackson, 2003; Kline, 2015). There are a total of 14 parameters in the current study. According to this formula (14:10) = 140 individuals should be reached. In the present study, it can be said that sufficient sampling was achieved, since 215 married individuals were studied. Demographic information of the research group is shown in Table 1.

Table 1. Demographic information of the research group

Variables		N	%
Gender	Male	64	29.8
	Female	151	70.2
	Total	215	100
Status of having a child	Yes there is	164	76.3
	No not	51	23.7
	Total	215	100
Education status	High school	32	14.9
	Undergraduate	127	59.1
	MA	37	17.2
	PhD	19	8.8
	Total	215	100
Way of marriage	Arranged	24	11.2
	By meeting, By loving	188	87.4
	Escaping	3	1.4
	Total	215	100
Duration of marriage	1 year or less	27	12.6
	2-5 years	68	31.6
	6-9 years	44	20.5
	10 years and above	76	35.3
	Total	215	100
Working status	Working	172	80.0
	Not working	43	20.0
	Total	215	100
Marriage Age	Range	Mean	Std. Deviation
	15-39	26.01	3.85
	Total	215	100

Data Collection Tools

Scale of Meaning of Marriage (SMM)

SMM, was developed by Özabacı, Körük and Kara (2018) and its validity and reliability analysis was performed. SMM has a total of nine sub-dimensions, including 31 items, positive and negative. Positive meaning dimensions; They are “Functionality”, “Devotion”, “Intimacy”,

"Complementarity", "Struggle", "Cooperation". Negative meaning dimensions are "Frustration", "Risk", and "Compliance Expectancy". Two grand total scores can be taken as SMM, positive meaning score and negative meaning score. Since the current study aimed to measure the positive meaning attributed to marriage, the positive meaning dimensions of SMM were used. Negative meaning dimensions were not evaluated in this study. Confirmatory factor analysis was used by Özabacı, Körük, and Kara (2018) to test the construct validity. In the confirmatory factor analysis findings, it was seen that the acceptable goodness of fit values of SMM were x2/df= 1.69, RMSEA= .060, and standardized regression loads ranged between .30 and .75. The reliability of SMM was evaluated by the Cronbach-Alpha internal consistency coefficient by Özabacı, Körük and Kara (2018). The internal consistency coefficient for the entire SMM was found to be .80. In the current study, the internal consistency coefficient of the entire SMM was found to be .86.

Marital Satisfaction Scale (MSS)

MSS, was developed by Çelik and Yazgan-İnanç (2009), at the same time its validity and reliability study was evaluated. MSS contains 13 items and three dimensions. These dimensions are; "Family", "Sex" and "Self". The construct validity was tested by Çelik and Yazgan-İnanç (2009) using exploratory and confirmatory factor analysis techniques. In the exploratory factor analysis findings, the total explained variance of MSS was 49.23%. In confirmatory factor analysis, it was determined that the goodness of fit value of the MSS was x2/df= 1.68, GFI= .90, NNFI= .91, CFI= .93 and SRMR= .07. In the reliability analysis of Çelik and Yazgan-İnanç (2009), the Cronbach-Alpha internal consistency coefficient was used. The internal consistency coefficient of the entire MSS was found to be .79. In the current study, the internal consistency coefficient for the entire MSS was observed as .78.

Marital Adjustment Test (MAT)

MAT was developed by Locke and Wallace (1959). Kışlak (1996) was adapted to Turkish, and its validity and reliability studies were carried out. MAT consists of 15 items and two dimensions. These; "Agreement" and "Relationship Style". Construct validity was evaluated by Kışlak (1996) with the exploratory factor analysis technique. In the exploratory factor analysis, the total explained variance on married people was 40.8%; in the sample of couples, the total explained variance was found to be 44.4. The reliability study was examined by Kışlak (1996) with the Cronbach-Alpha internal consistency coefficient. The internal consistency coefficient of the entire MAT was .84. In the current study, it was determined that the internal consistency coefficient for the entire MAT was .87.

Data Analysis

First, the preconditions of Structural Equation Modeling Are examined. In this context, preliminary analyses such as normality, tolerance, and VIF and Pearson product-moment correlation were carried out (Finney & DiStefano, 2013; Kline, 2015). After the preliminary analysis, Two-Stage Structural Equation Modeling was carried out in the present study. In the first stage, the measurement model; in the second stage, the structural model was tested (Anderson & Gerbing, 1988). Goodness of fit indices and acceptance criteria used in the interpretation of these models: [$2 \leq \chi 2/df \leq 3$; $.05 \leq$ RMSEA $\leq .08$; $.90 \leq$ IFI $\leq .95$; $.90 \leq$ CFI $\leq .95$; $.90 \leq$ GFI $\leq .95$; $.85 \leq$ AGFI $\leq .90$] (Bentler & Bonnet, 1980; Kline, 2015; Schermelleh-Engel, Moosbrugger & Müller, 2003). In addition, maximum likelihood estimation was used as the estimation method in the current study (Kline, 2015). Finally, bootstrap analysis was conducted to test whether the mediating effect was significant. For this aim, lower and upper limit confidence intervals were obtained over 1000 resamples by bootstrap analysis. In order to interpret the mediation effect as significant, the fact that the confidence intervals do not contain zero is taken into account as a criterion (Shrout & Bolger, 2002).

Results

Preliminary Analyses

In the present study, firstly, the preconditions of structural equation modeling were examined before analysis. Normality is covered in one of the prerequisites. The skewness values of the variables observed in the present study were between -1.45 and -.37; the kurtosis values were found to vary between -.74 and 3.19. Kalaycı (2010) stated that if the skewness and kurtosis measure take values in the range of ±3, it will show a normal distribution. In the study, it was calculated that the kurtosis and skewness values of all variables, except the “Cooperation” variable, varied between ±3 (see, Table 2). Finally, the multicollinearity prerequisite is; tolerance, VIF values and the correlation between the variables were examined. The tolerance value of the current research is .942; The VIF value was found to be 1.061. In this finding, when analysed according to Kline's (2015) criteria for tolerance greater than .10 and VIF less than 5, it is seen that there is no multicollinearity problem. Present study no multicollinearity problem since the latent variables in the structural model are Pearson product-moment correlation values (ranges from r=.142 to r=.544) (see, Table 5).

Table 2. Descriptive statistics of observed variables in the structural model

Observed variables	Mean	SD	Skewness	Kurtosis
Functionality	21.20	4.94	-.70	.48
Devotion	22.01	2.92	-.98	.72
Intimacy	13.74	1.72	-1.42	1.22
Complementarity	16.90	2.78	-.89	.34
Struggle	9.11	1.05	-1.37	2.36
Cooperation	13.78	1.32	-1.45	3.19
Agreement	27.66	10.37	-.37	-.74
Relationship Style	10.28	2.39	-.89	.53
Family	19.12	5.41	-.99	.26
Sex	16.71	3.04	-1.11	1.22
Self	17.40	2.68	-1.22	1.33

Note. SD: Standard Deviation

Table 3. Relationships between observed variables in the determined structural model

Observed Variables	1	2	3	4	5	6	7	8	9	10	11
1. Functionality	1										
2. Devotion	,448**	1									
3. Intimacy	,483**	,349**	1								
4. Complementarity	,374**	,502**	,390**	1							
5. Struggle	,196**	,459**	,254**	,285**	1						
6. Cooperation	,175*	,351**	,371**	,316**	,476**	1					
7. Agreement	,385**	,142*	,275**	,243**	,002	-,027	1				
8. Relationship Style	,580**	,210**	,469**	,347**	,082	,090	,536**	1			
9. Family	,317**	,091	,305**	,122	,013	,036	,305**	,484**	1		
10. Sex	,282**	,235**	,300**	,159*	,080	,056	,290**	,353**	,115	1	
11. Self	,339**	,073	,223**	,095	,055	,102	,478**	,520**	,391**	,275**	1

Note. *p<.05; **p<.01.

Two-Stage Structural Equation Modeling

Stage 1: Measurement Model

The measurement model includes 3 latent variables (“Positive Meaning of Marriage”, “Marital Satisfaction” and “Marital Adjustment”) and 11 observed variables (“Functionality”, “Devotion”, “Intimacy”, “Complementarity”, “Struggle”, “Cooperation”, “Family”, “Sex” “Self” “Agreement” and “Relationship Style”). When the measurement model is analysed, it was found to be acceptable goodness of fit indices: (χ2/df (102.977/38) = 2.71, IFI= .90, CFI= .90 GFI= .92, AGFI =.86, RMSEA = .08 (90) %CI for RMSEA = [.06, .11]. In addition, all standardized factors (ranging from .30 to .85) and t values of the measurement model were found to be significant (see, Table 4).

Table 4. Results of the measurement model

Predicted		Predictor	Estimate	S.E.	C.R.	p
Complementarity	<---	PMM	1.000			
Family	<---	MS	1.000			
Self	<---	MS	.582	.087	6.694	***
Agreement	<---	MA	1.000			
Relationship Style	<---	MA	.314	.035	8.989	***
Struggle	<---	PMM	.207	.057	3.612	***
Cooperation	<---	PMM	.301	.074	4.046	***
Devotion	<---	PMM	1.019	.152	6.688	***
Intimacy	<---	PMM	.782	.120	6.540	***
Sex	<---	MS	.421	.086	4.873	***
Functionality	<---	PMM	2.540	.371	6.843	***

Note. ***p<.001, PMM: Positive Meaning of Marriage, MS: Marital Satisfaction, MA: Marital Adjustment.

Table 5. Correlations regarding the latent variables in the structural model

Latent Variables	1	2	3
1. PMM	-		
2. MS	.24**	-	
3. MA	.25**	.54**	-

Note. **p<.01, PMM: Positive Meaning of Marriage, MS: Marital Satisfaction, MA: Marital Adjustment.

Stage 2: Structural Model

First step: A Direct-Effect Model

In the first step a direct-effect model was tested to examine the effect of the exogenous variable (PMM: Positive Meaning of Marriage) on the endogenous variable (MA: Marital Adjustment) in the absence of mediating variable (MS: Marital Satisfaction). The direct path coefficient from (PMM: Positive Meaning of Marriage) to (MA: Marital Adjustment) was significant ((β = .59, p < .001). In other words, it was determined that there is a direct and significant relationship between the exogenous (PMM: Positive Meaning of Marriage) and endogenous (MA: Marital Adjustment) variables.

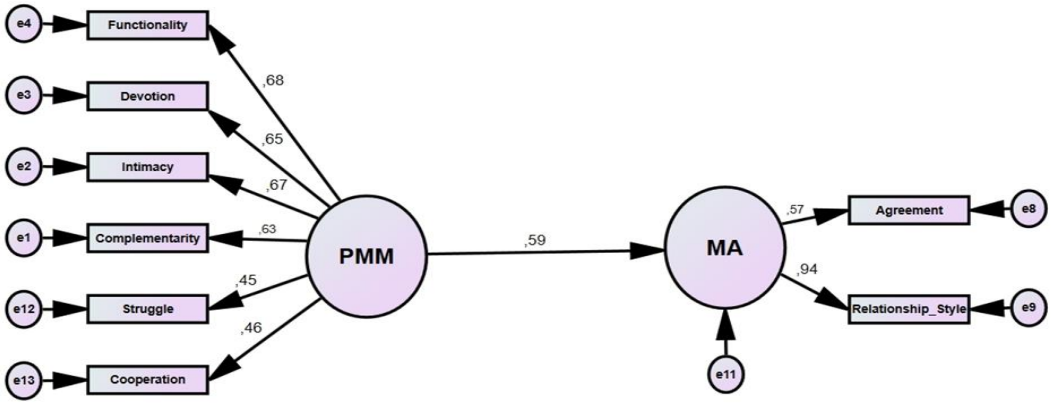

Figure 2. Standardized regression weights of direct-effect model

Note. PMM: Positive Meaning of Marriage, MA: Marital Adjustment.

Second step: *Structural Model*

In the second step was to evaluate structural model that explained the direct relationship between (*PMM: Positive Meaning of Marriage*) and (*MA: Marital Adjustment*) and added paths from (*PMM: Positive Meaning of Marriage*) to (*MS: Marital Satisfaction*) and from (*MS: Marital Satisfaction*) to (*MA: Marital Adjustment*). When structural model was tested, RMSEA= .12; χ2/df (167,750/41) = 4.09 was obtained. When the results were examined, it was concluded that three error covariance matrices should be added between Devotion and Complementarity; Devotion and Struggle; Struggle and Cooperation. Finally, with the addition, the structural model was found to be acceptable of goodness of fit indices (χ2/df (102.977/38) = 2.71, IFI= .90, CFI= .90 GFI= .92, AGFI=.86, RMSEA = .08 (90) % CI for RMSEA = [.06, .11]. However, in this structural model, it was determined that (*PMM: Positive Meaning of Marriage*) had no significant direct effect on (*MA: Marriage Adjustment*) (β = .20, p > .05). These results show the full mediation role of (MS: Marital Satisfaction) between (PMM: Positive Meaning of Marriage) and (MA: Marital Adjustment).

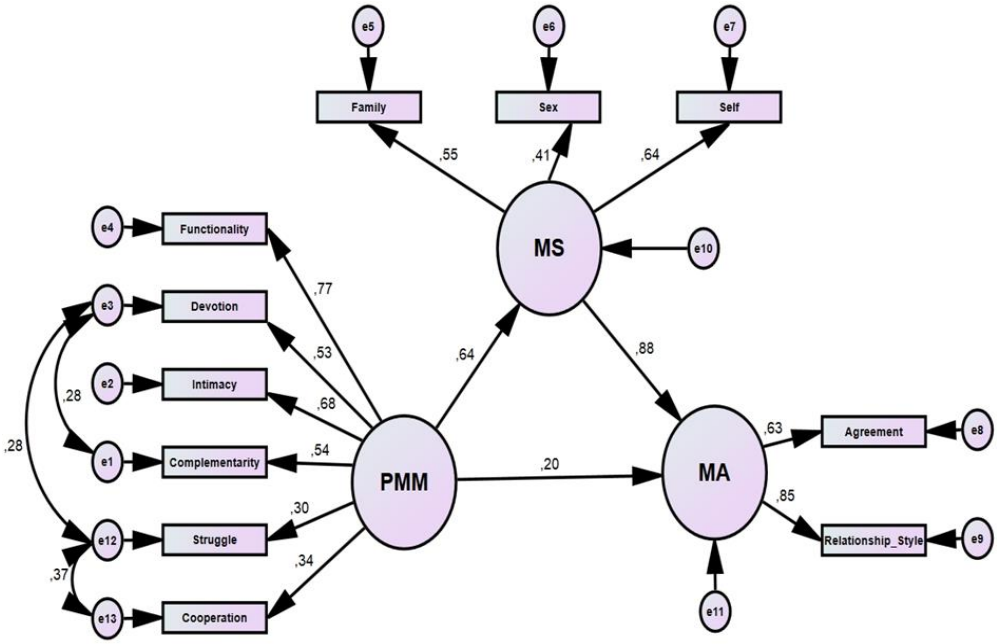

Figure 3. Standardized regression weights of structural model

Note. PMM: Positive Meaning of Marriage, MS: Marital Satisfaction, MA: Marital Adjustment.

According to Figure 3, a one-unit increase in (PMM: Positive Meaning of Marriage) increases (MS: Marital Satisfaction) by 0.64 (t=4.672; p<.001). Likewise, a one-unit increase in (MS: Marital Satisfaction) increases (MA: Marital Adjustment) by 0.88 (t=4.220; p<.001). On the other hand, the effect of (PMM: Positive Meaning of Marriage) on (MA: Marital Adjustment) is not significant (β= .20, t=1.396; p>.05).

Table 6. Goodness of fit indices of structural model

Fit Measure	Acceptable Fit Criteria	Model values
[1]χ^2/df	$2 \leq \chi 2/df \leq 3$	2.71
[2]RMSEA	$.05 \leq RMSEA \leq .08$	.08
[3]IFI	$.90 \leq IFI \leq .95$	.90
[4]CFI	$.90 \leq CFI \leq .95$	.90
[5]GFI	$.90 \leq GFI \leq .95$	.92
[6]AGFI	$.85 \leq AGFI \leq .90$	.86

Note: [1, 2, 5, 6,](Schermelleh-Engel, Moosbrugger and Müller, 2003), [3](Bentler & Bonnet, 1980), [4] (Kline, 2015).

Table 7. Results of the structural model

Predicted		Predictor	Estimate	S.E.	C.R.	p
MS	<---	PMM	1.260	.270	4.672	***
MA	<---	MS	1.940	.460	4.220	***
MA	<---	PMM	.862	.618	1.396	.163
Complementarity	<---	PMM	1.000			
Functionality	<---	PMM	2.540	.371	6.843	***
Family	<---	MS	1.000			
Self	<---	MS	.582	.087	6.694	***
Agreement	<---	MA	1.000			
Relationship Style	<---	MA	.314	.035	8.989	***
Struggle	<---	PMM	.207	.057	3.612	***
Cooperation	<---	PMM	.301	.074	4.046	***
Devotion	<---	PMM	1.019	.152	6.688	***
Intimacy	<---	PMM	.782	.120	6.540	***
Sex	<---	MS	.421	.086	4.873	***

Note. ***p<.001, PMM: Positive Meaning of Marriage, MS: Marital Satisfaction, MA: Marital Adjustment.

Bootstrap Analyses (Significance of Indirect Effects)

Bootstrap analyses was conducted to provide further evidence for the significance of (MS: Marital Satisfaction)'s full mediator role between (PMM: Positive Meaning of Marriage) and (MA: Marital Adjustment). In this direction, 1000 resamples were made and lower-upper confidence intervals were established. The fact that these confidence intervals do not contain zero indicates that the indirect effect is significant (Shrout & Bolger, 2002). The results are shown in Table 8.

Table 8. Bootstrap analyses results

Independent variable	Mediator variable	Dependent variable	Standardized path coefficient (β)	SE	Lower 95% CI	Upper 95% CI	p
PMM →	MS →	MA	.563	.389	.293	1.401	.002

Note. *p<.05, PMM: Positive Meaning of Marriage, MS: Marital Satisfaction, MA: Marital Adjustment.

When Table 8 was examined, it was observed that the full mediator role of (MS: Marital Satisfaction) between (PMM: Positive Meaning of Marriage) and (MA: Marital Adjustment) was

significant ([β = .563, 95% CI (.293, 1.401)]. All the mentioned findings can be shown as proof of the full mediating role of (MS: Marital Satisfaction).

Table 9. Evaluation of structural model

Hypotheses	Model pathways	Standardized Coefficients	p	Effect Size	Remark
	Direct effect				
H^1	PMM → MS	0.64***	.000	High	Supported
H^2	MS → MA	0.88***	.000	High	Supported
H^3	PMM →MA	0.20	.163	Low	Unsupported
	Mediator Effect				
H^4	PMM → MS → MA	0.56**	.002	High	Supported
	Total Effect				
	PMM → MA	0.76		High	-

Note. ***p<.001, **p<.01, PMM: Positive Meaning of Marriage, MS: Marital Satisfaction, MA: Marital Adjustment. Path coefficients effect size as low below .10, medium below .30 and high above .50 (Kline, 2015).

Discussion, Conclusion and Recommendations

The aim of this research is to test a structural model for married individuals. As a result of the analyses, the tested structural model was confirmed and it was determined that marital satisfaction had a full mediator effect between the meaning attributed to marriage and marital adjustment of married individuals. The research findings are discussed below within the framework of the literature.

The close relationship process has three stages. These; it is initiation, maintenance and termination (Eryılmaz & Atak, 2011). Looking at the literature, it is seen that the focus is on the initiation phase of close relationships (Eryılmaz & Atak, 2009; Eryılmaz & Atak, 2011; Eryılmaz & Doğan, 2013). On the other hand, the maintenance phase is; it is important in terms of the quality, satisfaction and harmony of the relationship (Çırakoğlu & Tezer, 2010). In such an important matter, the marital relationship of the individual it is an acquisition that married individuals need, with which resources they continue. The current research has determined that married individuals attribute a positive meaning to marriage, and with the positive effect of this, they get satisfaction from marriage, and as a result, they continue their close relationship processes by adapting to their marriage. On other hand; marital satisfaction, marital adjustment, meaning of marriage can be considered as important sources of the maintenance phase of close relationship psychology.

In the first of the findings obtained within the scope of the research, it was seen that the meaning attributed to marriage predicted the marital satisfaction of married individuals in a significant and positive way. In other words, the positive meaning attributed to marriage in married individuals increases marital satisfaction. When the literature on the results is examined, according to Güler's (2021) research, as the positive meaning attributed to marriage increases, marriage anxiety decreases. In addition, according to Yazıcı and Demirli (2020), the positive meaning attributed to

marriage before marriage shows that the couples' views on marriage are also positive. Although there are no direct correlational studies between the meaning attributed to marriage and marital satisfaction in the literature, Timmer and Orbuch (2001) stated that the meaning of marriage is a part of a cognitive structure that enables individuals to understand and evaluate marriage. The meaning of marriage is the key to the dynamics that occur in married life. Individuals form meaning about events, objects and a person in their social environment through interaction. When a couple marries, the individual interpreting the meaning of marriage reflects the general culture of social experience, language, and general beliefs about marriage, rather than interactions with the spouse. As a matter of fact, in the study conducted by Hamamcı (2005), it is seen that there is an inverse relationship between irrational relationship beliefs and marital satisfaction. Based on the information and findings mentioned above, we can say that the finding that a positive meaning for marriage positively predicts marital satisfaction is also supported by the literature.

In the second of the findings obtained within the scope of the research, it was confirmed that the marital satisfaction of married individuals affected their marital adjustment significantly and positively. It has been seen that the results are also supported by the literature, and it has been determined that there are positive relationships between marital satisfaction and marital adjustment (Heyman, Sayers, & Bellack, 1994; Özbek, 2018; Yaşar, 2009; Yılmaz, 2001). The high level of relationship between the concept of marital satisfaction and the concept of marital adjustment has led to these concepts being used interchangeably in the literature. However, while marital satisfaction expresses the psychological satisfaction that differs personally (Sokolsi & Hendrick, 1999), marital adjustment has a relational feature. According to Kendrick and Drentea (2016), high marital satisfaction of spouses is a feature of harmonious marriages. Fincham, Bradbury, and Baucom's (1986) attribution theory in marriage shows that the answers given by individuals to the question "Why" have internal or external attributions, and this is related to marital satisfaction. Therefore, it can be stated that these attributions can also be a determinant of relational unity. As a result, it has been stated that couples with high marital satisfaction can cope with the difficulties they encounter in marriage more easily and show less stress symptoms (Kirby 2005). It is thought that the fulfilment of these factors will increase the adjustment in marriage.

When the third and fourth findings obtained within the scope of the research are considered together; it was found that the direct effect of the meaning attributed to marriage on marital adjustment was significant, but this effect became meaningless with the addition of marital satisfaction as a mediator variable in the model. In other words, in a triple model in which the meaning attributed to marriage, satisfaction in marriage and harmony in marriage take place; when the meaning attributed to marriage increases the satisfaction of married individuals, harmony occurs in marriage. According to the symbolic interactionism theory, the meaning-making process is based

on both personal and interpersonal interactions (Blumer, 1969). The demographic status of the person and socio-cultural changes also shape the meaning attributed to marriage (Peters, 2018). In addition, individuals' perceptions of marriage are represented according to marriage models observed from early childhood (Hovardaoğlu & Binici-Azizoğlu, 1996). Marriage satisfaction of individuals who have negative mental representations and schemas are also negatively affected (Altun, 2015). Young et al. (2003) revealed that individuals with an addiction schema lead them not to take responsibility in marriage, and this reduces their marital satisfaction. As a matter of fact, marital satisfaction is a variable that is affected by the meaning attributed to marriage. In addition, individuals with high marital satisfaction also have high life satisfaction (Soylu & Kabasakal, 2016), it is easier to cope with the problems they encounter in life (Erber et al., 2005), stress and anxiety levels are lower (Tuzcu, 2017) they were found to be more connected (DeMoss, 2004; Goodman, 1999; Kirby, 2005).

In this study, the meaning that married individuals attribute to marriage and their marital satisfaction are the determining variables in their marital adjustment. The meaning that married individuals attribute to marriage increases the satisfaction in marriage, which brings along marital harmony. Considering the results, it can be suggested that the variables in the model be used in experimental studies that will increase the marital adjustment of married individuals in the future. Another suggestion is that a structural model of marital adjustment was reached for married individuals in this study. In the future, qualitative research approach-based studies can be conducted to describe more deeply the marital adjustment of married individuals. Limitations of this study, instantaneous cross-sectional data were collected. The study was conducted on married individuals living in Istanbul. Three error covariance matrices were applied in the structural model testing process.

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The Relationship of Reading Attitude with Reading Speed and Reading Comprehension

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Abstract

Accurate and effective reading depends on several variables such as the continuation of the reading activity at a certain speed, the understanding of what is read at a certain level, and having a positive attitude towards reading. In this study, research was conducted to determine whether there is any relationship between reading attitude and reading speed, and reading comprehension. A total of 400 students from the Turkish and Classroom Teaching departments of two different universities took part in the research carried out according to the relational screening method. After determining the reading speed and comprehension levels of the students, their attitudes towards reading were taken. Obtained data were analyzed using SPSS 21 program. As a result of the research, it has been determined that there is a positive and highly significant relationship between the average reading speed and the average comprehension level, between the average reading speed and the average attitude towards reading, and between the average comprehension level and the average attitude towards reading. The results obtained were discussed together with similar results in the literature.

Keywords: Reading speed, comprehension level, reading comprehension, reading attitude.

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Introduction

Reading, which can be defined as the process of deciphering the alphabetic codes agreed upon by a certain community and gaining meaning in the mind; is a very complex process that is not natural in human life but can be acquired later, that can affect the whole life of the individual, and that provides competence in social, cultural and cognitive fields (Kesgin & Akyol, 2014). Even though knowledge continues to accumulate at this point, reading maintains its importance as one of the most frequently used skills. For this reason, reading speed and reading comprehension skills should also increase as knowledge accumulation increases rapidly. With an increase in this direction, the way to reach information in a shorter time and more effectively will be opened (Durukan, 2013). However, it should not be forgotten that the attitude towards reading is another important factor that comes into play at this point.

The attitude required for the reading skill to attain a certain quality shows a complex structure in terms of human behavior, emotions, and thoughts, the position it occupies in society, and the main material in the socialization process. Some basic concepts are effective in the formation and maintenance of this complex structure. Attitudes are among these basic concepts (Temizkan & Sallabaş, 2009). Attitudes are an important factor that directs the behavior of the individual towards the attitude object and prepares it for motivation. In this respect, attitude can be defined as a state of constant readiness that determines whether an individual will show a positive or negative emotional reaction to any object (Erden, 1995). Considering that attitude is a positive or negative reaction to reading, it is possible that individuals' developing a positive attitude towards reading progress in reading skills may have a certain effect on reading speed and reading comprehension.

Another essential component of fluent reading is reading speed. Reading speed is frequently measured in fluent reading studies. The correct reading of words helps students to increase their reading speed. The correct reading is an important threshold for comprehension and has a direct impact on reading speed. Thanks to repetitive readings, the progressive reading speed makes reading an automatic skill. At this stage, reading takes on a spontaneous structure (Samuels, 1979). Automation is generally used to express tasks that are easily performed without much effort (Deeney, 2010). Automating a skill means that it is done at a certain pace, in a certain rhythm.

Reading skill is divided into three reading aloud, reading silently, and reading poetry aloud. (MEB, 2011). In silent reading, the process that begins with the eye's recognition of the text is completed with the memory's interpretation of what is read. The voice, vocal cords, tongue, ear, and sound waves, which are called vocal organs, do not take part in this process. Although it is the most used type of reading, it helps the individual to read and learn by himself, to work, and use his time

more effectively. In this type of reading, the speed of reading increases, and the level of comprehension increases (Güneş, 2000).

Reading aloud is the expression of the codes that are received by the eye and transmitted to the memory with speech organs in the context of the meaning attributed to the writing. The purpose of this type of reading is to provide individuals with reading skills by the rules of their mother tongue. In addition, with this type of reading, the individual learns to use his language by the rules (Aktaş & Gündüz, 2009). Reading speed is the time it takes to see the word and recognize it (decode it) and read it aloud or silently (Baştuğ & Akyol, 2012). In this sense, reading speed is important in both oral reading and silent reading. The fact that the reading speed is at a certain speed and in a certain rhythm directly contributes to the automation of the reading skill and makes reading a meaningful skill.

In order to ensure that reading achieves its purpose, one of the factors that must exist besides reading speed is comprehension. In reading comprehension, there are different skills such as establishing relationships between words, sentences, and paragraphs, comprehension, analysis, synthesis, evaluation, and interpretation (Coşkun, 2002). There are some studies in Turkey and abroad on whether there is a relationship between "reading speed" and "reading comprehension", which are two important concepts in the reading process (Akçamete, 1980; Sticht, 1984; Akçamete & Güneş, 1992; Dökmen, 1994; Dedebali, 2008; Bozan, 2012; Kaçar, 2015; Kurudayıoğlu & Soysal, 2015; Yalçın, Erdoğan Çeltik & Altınok, 2017; Mergen, 2019; Durukan, 2020; Yalçın Akkaş, 2021). In these studies, it has been found that there are links in different directions (positive and negative) between reading speed and reading comprehension skills. These studies focused on the increase in reading speed and reading comprehension level with the reading methods and techniques learned as a result of a certain education, as well as the relationship between reading speed and comprehension rate, but reading attitude was not questioned as a third variable. While there is no study on the relationship between reading attitude and reading speed in the literature, there are few studies that question the relationship between reading attitude and reading comprehension skills (Çakıcı, 2005; Şeflek Kovacıoğlu, 2006; Sallabaş, 2008; Karabay & Kayıran, 2010; Ünal, 2012; Ürün Karahan & Taşdan, 2016; Dwie Agustiani, 2017; Ahmad and Yamad, 2021) were reached. In this study, unlike previous studies, the relationship between reading speed, reading comprehension, and reading attitude was examined, and it was examined whether students with high reading speed and reading comprehension level also had high attitudes towards reading. In the study, the participants were not given any training on reading, the application was carried out on the current reading speeds and comprehension levels of the participants. The starting point of the study is that if the reading attitude is related to reading speed and reading comprehension, studies on reading attitude should not be considered separately from reading speed and reading comprehension skills. It is predicted that the

results obtained in the study will be the source of new studies to be done. In this context, the questions sought to be answered in the research are as follows:

• Is there a relationship between reading speed and reading comprehension?
• Is there a relationship between reading speed and attitude towards reading?
• Is there a relationship between reading comprehension and attitude towards reading?

Method

Research Design

In this study, the relational survey model, which is one of the general survey models from quantitative research methods, was used. The scanning model is the whole of the processes that describe a past or present situation as it exists, applied for the realization of learning and the development of desired behaviors in the individual. In the general scanning model, in a universe consisting of many elements, the whole universe or a group of samples or samples to be taken from it are scanned to make a general judgment about the universe. A relational screening model is a screening approach that aims to determine the existence of co-variation between two or more variables. In the relational screening model, it is tried to determine whether the variables change together, and if there is, how this happens (Karasar, 2011).

Participants

The research was carried out with 1st, 2nd, 3rd, and 4th-grade teacher candidates studying in the Turkish Language Teaching and Classroom Teaching programs of two education faculties in the Central Anatolia Region and the Western Black Sea Region in the 2021-2022 academic year. In this study, it was deemed appropriate to work with students studying in the field of Turkish Language Teaching and Classroom Teaching, since the relationship between reading attitude and reading speed, and reading comprehension was questioned. 400 pre-service teachers took part in the study, which was carried out using the purposive sampling method. Balcı (2010) stated that in purposive sampling, the researcher uses his judgment about who will be selected, and he chooses those who are most suitable for the research. The participant information in the research is as follows:

Table 1. Information about the participants in the study

Department	Grade Level	Number of Students
Turkish Language Teaching	1	50
	2	50
	3	50
	4	50
Classroom Teaching	1	50
	2	50
	3	50
	4	50
Total		400

Of the 400 participants in Table 1, 50 students at each grade level were selected as a sample. 200 students from the Department of Turkish Language Teaching and 200 students from the Department of Classroom Teaching took part in the study. 169 of the participants are male students and 231 are female students.

Procedure

In the research, first of all, the reading texts and reading comprehension tests to be used in the applications were determined. Then, the participants were informed in detail about the application to be made. The application was carried out in three separate sessions, one week apart. In the first session, a narrative text was read to the students and they were provided to solve the multiple-choice tests related to this text. In the second session, an informative text was read to the same students and they were allowed to solve the multiple-choice tests related to this text. While the students were solving the tests, they answered without looking back at the text. The averages of the students' reading speeds and reading comprehension achievement levels obtained from two different texts were taken. In the third session, the reading attitudes of the same students were taken through the reading attitude scale.

The texts read during the application process were previously reproduced by the researcher and distributed to the participants before the application. The students started to read the text at the same time by silent reading and the reading time of each student who finished was recorded in seconds by the researcher. After the reading process was completed, the reading comprehension questions were distributed and the application was completed with the solution to the questions. The same process was carried out for both the narrative and the informative text, at one-week intervals. At the last stage, the applications were completed with the completion of the attitude scale towards reading.

Data Collection Process

The data collection process of the study covers three weeks in October 2021. The process was completed by reading the narrative text and solving the questions related to this text in the first week of October, reading the informative text and solving the questions related to this text in the second week, and filling out the attitude scale toward reading in the third week. The schematic view of the data collection process is as follows:

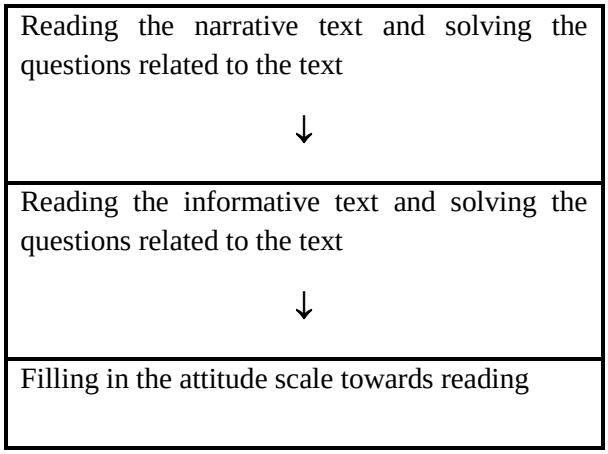

Figure 1. The data collection process of the study

Data Collection Tools

In the research, narrative and informative texts and reading comprehension tests related to these texts as well as an attitude scale towards reading were used as data collection tools.

Narrative and Informative Texts

The texts used in the research were taken from the section of "Reading Comprehension Scales: Secondary Education-Higher Education Level" of Karatay's (2018) "Reading Education Theory and Practice", depending on the permission of the author. While there are 1968 words in the narrative text, there are 1388 words in the informative text. In the selection of the texts, it was taken into account that they were suitable for the level of the student.

Reading Comprehension Tests

Reading comprehension tests are included in the relevant source (Karatay, 2018) as questions related to the text right after the texts. Reading comprehension tests, which are multiple-choice questions, consist of twenty-five questions each. The validity and reliability studies of the tests have been carried out, which has been the reason for the preference for their use in this study.

Attitude Scale Towards Reading

The "Attitude Towards Reading" scale used in the research is a study by Sarar Kuzu and Doğan (2015). The scale was chosen for use in this study with the written permission of the first author. The fact that the scale was prepared for university students is also an important reason for preference.

Data Analysis

After obtaining data from prospective teachers of two different universities in the study, the data were analyzed using the SPSS 21 package program. The information obtained is presented in tables with detailed explanations under the title of "Findings" of the study.

Findings

To evaluate the data obtained from the measurement tools used in the study group of the research, first of all, their normal distribution was examined, and then the appropriate analysis technique was decided. Accordingly, before the comparison of the scores, the normality test was performed to determine the statistical technique. According to the normality test results, parametric or non-parametric statistical techniques were used for comparison. The results of the normality analysis regarding the test scores of the students are presented in Table 2.

Table 2. Normality distribution of reading speed, comprehension level, and reading attitude scores

Substances	Skewness Value	Kurtosis Value
Reading speed	,273	,173
Reading comprehension level	-,525	2,449
Attitude toward reading	,065	-1,921

Looking at Table 2, it is seen that the skewness and kurtosis values in the normality distribution test are between -3 and +3. Therefore, it was determined that the data obtained in the study were normally distributed, and parametric tests were used in the analyzes performed. After the normality findings, a Pearson correlation analysis was conducted for the relationships between reading speed, comprehension level, and attitude towards reading, and the data obtained are presented in Table 3.

Table 3. Pearson correlation analysis results for the relationships between reading speed, comprehension level, and attitude toward reading

		Reading speed average	Reading comprehension level average	Average attitude towards reading
Reading speed average	Pearson Correlation	1	,746**	,665**
	Sig. (2-tailed)		,000	,000
	N	400	400	400
Reading comprehension level average	Pearson Correlation	,746**	1	,644**
	Sig. (2-tailed)	,000		,000
	N	400	400	400
Average attitude towards reading	Pearson Correlation	,665**	,644**	1
	Sig. (2-tailed)	,000	,000	
	N	400	400	400

*p<,05

As a result of the Pearson correlation analysis, it was determined that there was a positive and highly significant relationship between the mean reading speed and the mean comprehension level (r=.746; p<.05). Similarly, a positive and highly significant relationship was found between the average reading speed and the average attitude towards reading (r=.665; p<.05). In addition, it was determined that there was a positive and highly significant relationship between the mean comprehension level and the mean attitude towards reading (r=.644; p<.05). According to the findings, it is seen that students with high reading speed and comprehension have a positive attitude towards reading. Another analysis made within the scope of the research is the independent group's t-test regarding the difference between the gender variable and the reading speed, comprehension level, and reading attitude scores. The data obtained are presented in Table 4.

Table 4. Independent group's t-test results regarding the difference between gender variable and reading speed, comprehension level, and reading attitude scores

	Gender	N	Av.	sd	se	df	t	p
Reading speed	Male	169	159,90	24,16	2,318	398	,262	,233
	Female	231	159,29	21,93				
Reading comprehension level	Male	169	68,33	11,24	1,211	398	,109	,542
	Female	231	68,19	12,46				
Attitude towards reading	Male	169	124,71	23,09	2,352	398	-,158	,807
	Female	231	125,08	23,34				

*p<,05

As a result of the analysis, it was found that the scores of reading speed, comprehension level, and attitude towards reading did not differ significantly according to the gender variable (p>.05). Therefore, the reading speed, comprehension level, and reading attitude scores of male and female students did not statistically different according to gender groups. Another analysis is the independent group's t-test regarding the difference between the department variable and the scores of reading speed, comprehension level, and attitude towards reading. The data obtained are presented in Table 5.

Table 5. Independent group's t-test results regarding the difference between the department variable and the scores of reading speed, comprehension level, and attitude toward reading

	Department	N	Av.	sd	se	df	t	p
Reading speed	Turkish Language Teaching	200	158,90	23,35	2,289	398	-,568	,106
	Classroom Teaching	200	160,20	22,41				
Reading comprehension level	Turkish Language Teaching	200	68,98	12,08	1,194	398	1,214	,025*
	Classroom Teaching	200	67,53	11,79				
Attitude towards reading	Turkish Language Teaching	200	125,22	23,48	2,324	398	,803	,250
	Classroom Teaching	200	124,64	22,99				

*p<,05

As a result of the analysis, it was revealed that the scores of reading speed and attitude towards reading did not differ significantly according to the department variable (p>.05). Therefore, the reading speed and reading attitude scores of Turkish Language Teaching and Classroom Teaching students did not statistically change according to the department groups. On the other hand, it was revealed that the comprehension level scores differed significantly according to the department variable (p<.05). Therefore, the comprehension level scores of Turkish and Classroom Teaching students changed statistically according to the department groups, and the mean level of comprehension of female students was higher than that of male students (Female: 68.98; Male: 67.53). Another analysis conducted within the scope of the research is the one-way analysis of variance (ANOVA) regarding the differences between the class variable and the reading speed, comprehension level, and reading attitude scores. The results obtained are presented in Table 6.

Table 6. One-way analysis of variance (ANOVA) results regarding the differences between the grade variable and the scores of reading speed, comprehension level, and attitude towards reading

		Sum of squares	df	Mean of squares	F	Sig.
Reading speed	Between groups	131866,544	3	43955,515	226,356	,000*
	In-group	76898,246	396	194,187		
Reading comprehension level	Between groups	33134,771	3	11044,924	183,440	,000*
	In-group	23843,219	396	60,210		
Attitude towards reading	Between groups	145867,157	3	48622,386	278,457	,000*
	In-group	69146,883	396	174,613		

*p<,05

As a result of the analysis, it was revealed that the scores of reading speed, comprehension level, and attitude towards reading differed significantly according to the grade level [p<,05]. As a result of the one-way analysis of variance (ANOVA) performed in Table 4, statistically, significant differences were obtained between the reading speed, comprehension level, and reading attitude scores of the class variable groups (F(3-396)=226,356; p=.000). To determine the source of these significant differences, the Tukey Test, one of the multiple comparison tests, was applied and the results of the test are given in Table 7.

Table 7. Tukey test results regarding the differences between the grade level variable and the scores of reading speed, comprehension level, and attitude towards reading

Independent variable	(I) Class	Average	(J) Class	Average difference	p.
Reading speed	1st-grade	140,72	2nd-grade	-1,39844	,893
			3rd-grade	-36,10376*	,000
			4th-grade	-37,80664*	,000
	2nd-grade	142,12	1st-grade	1,39844	,893
			3rd-grade	-34,70532*	,000
			4th-grade	-36,40820*	,000
	3rd-grade	176,82	1st-grade	36,10376*	,000
			2nd-grade	34,70532*	,000
			4th-grade	-1,70288	,823
	4th-grade	178,52	1st-grade	37,80664*	,000
			2nd-grade	36,40820*	,000
			3rd-grade	1,70288	,823
Reading comprehension level	1st-grade	60,05	2nd-grade	1,77658	,369
			3rd-grade	-17,69570*	,000
			4th-grade	-16,86216*	,000
	2nd-grade	58,28	1st-grade	-1,77658	,369
			3rd-grade	-19,47227*	,000
			4th-grade	-18,63874*	,000
	3rd-grade	77,75	1st-grade	17,69570*	,000
			2nd-grade	19,47227*	,000
			4th-grade	,83353	,873
	4th-grade	76,92	1st-grade	16,86216*	,000
			2nd-grade	18,63874*	,000
			3rd-grade	-,83353	,873
Attitude towards reading	1st-grade	107,76	2nd-grade	3,74217	,189
			3rd-grade	-34,63558*	,000
			4th-grade	-37,67880*	,000
	2nd-grade	104,02	1st-grade	-3,74217	,189
			3rd-grade	-38,37776*	,000
			4th-grade	-41,42097*	,000
	3rd-grade	142,39	1st-grade	34,63558*	,000
			2nd-grade	38,37776*	,000
			4th-grade	-3,04322	,364
	4th-grade	145,44	1st-grade	37,67880*	,000
			2nd-grade	41,42097*	,000
			3rd-grade	3,04322	,364

*p<,05

Considering the findings in Table 7, significant differences were observed between grade level variables and reading speed scores between grade 1, grade 3, and grade 4 [p<,05]. Accordingly, it was concluded that the reading speed scores of the 1st-grade students were significantly lower than the reading speed scores of the 3rd and 4th-grade students. At the same time, significant differences were determined between the 2nd-grades and the 3rd and 4th-grades. According to these results, it was concluded that the reading speed scores of the 2nd-grade students were significantly lower than the reading speed scores of the 3rd and 4th-grade students.

According to Table 7, there were significant differences between the grade level variable and the comprehension level scores between the 1st-grade and the 3rd and 4th-grades [p<.05].

Accordingly, it was concluded that the comprehension level scores of the 1st-grade students were significantly lower than the 3rd and 4th-grade students' comprehension levels. At the same time, significant differences were determined between the 2nd grades and the 3rd and 4th grades. Accordingly, it was concluded that the comprehension level scores of the 2nd-grade students were significantly lower than the 3rd and 4th-grade students' comprehension level scores.

According to Table 7, there were significant differences between the grade level variable and the reading attitude scores between the 1st-grade, the 3rd-grade, and the 4th-grade [p<,05]. Accordingly, it was concluded that the 1st-grade students' attitude scores towards reading were significantly lower than the 3rd and 4th-grade students' attitude scores toward reading. At the same time, significant differences were determined between the 2nd-grades and the 3rd and 4th-grades. According to these results, it was concluded that the reading attitude scores of the 2nd-grade students were significantly lower than the 3rd and 4th-grade students' attitude scores towards reading.

Discussion, Conclusion and Recommendations

According to the results obtained in this study, in which the existence of a relationship between reading attitude and reading speed, and reading comprehension was questioned, it was determined that there was a positive and highly significant relationship between the average reading speed and the average comprehension level. This result has been found in studies that found a positive relationship between reading speed and comprehension level in the literature (Akçamete & Güneş, 1992; Bozan, 2012; Dedebali, 2008; Dökmen, 1994; Erbaş, 2021; Kaçar, 2015; Kurudayıoğlu & Soysal, 2015; Mergen, 2019; Sticht, 1984; Yalçın, Erdoğan Çeltik & Altınok, 2017; Yalçın Akkaş, 2021; Yen, 2012) are similar to the results obtained. While these studies argue that there is a positive relationship between reading speed and comprehension level, Akçamete (1980) and Durukan (2020) did not find a positive relationship between reading speed and comprehension level.

In the study, it was determined that there was a positive and highly significant relationship between the average reading speed and the average attitude towards reading. At the same time, it has been determined that there is a positive and highly significant relationship between the mean comprehension level and the mean attitude towards reading. This result is compatible with the result of Ünal's (2012) study that found a high level and significant relationship between students' reading attitudes and their reading comprehension levels. In another study, Karabay and Kayıran (2010) determined that there is a significant relationship between students' reading comprehension skills and their attitudes towards reading. The studies of Şeflek Kovacıoğlu (2006) are also similar to the results of this study. Sallabaş (2008), Dwie Agustiani (2017), and Ahmad and Yamad (2021) revealed in their studies that students' reading attitudes and their reading comprehension skills are correlated at a low level. However, in the studies of Çakıcı (2005), Ürün Karahan and Taşdan (2016), it was

determined that students' attitudes towards reading did not predict reading comprehension, and it was stated that this might be related to the diversity of the sample and the development of the skill to be measured.

Another result obtained in the study is that the scores of reading speed, comprehension level, and attitude towards reading do not differ significantly according to the gender variable. Similarly, reading speed and reading attitude scores did not differ significantly according to the departments of the students. The mean level of understanding of the female students in the study was higher than the male students. This result can be found in similar studies in the literature (Wang & Guthire, 2004; Anılan, 2004; Güngör & Açıkgöz, 2005; Ateş, 2008; Sallabaş, 2008; Temizyürek, 2008; Balcı, 2009; Yıldız, 2010; Katrancı & Kuşdemir, 2016; Altunkaya, 2017; Türkben & Gündeger, 2021) female students' reading comprehension mean scores are higher than that of male students, which is consistent with the results. However, in this study, there was no difference between male and female students in terms of reading attitude. While this result is similar to the studies of Akyol (2005) and Suna (2006), there are significant differences between male and female students' reading attitudes (Mckenna, Kear & Ellsworth, 1995; Küçük, 1998; Güngördü, 2006; Sallabaş, 2008; Anastasiadou, 2009; Balcı, 2009; Kush & Watkins, 2010; İşeri, 2010 and Ünal, 2012) differ with studies.

According to the results obtained in the analyzes made in terms of the class variable, it was revealed that the scores of reading speed, comprehension level, and attitude towards reading between 1st and 2nd-grade students and 3rd and 4th-grade students differed significantly according to grade level. Reading attitudes of 3rd and 4th-grade students are significantly higher than 1st and 2nd-grade students' reading attitudes. This can be explained by the fact that as the classes progress, the lessons related to the mother tongue increase, the experience in reading increases, the number of content read increases, and the development of a reading culture has reached a higher level. In a similar study conducted at the primary school level (Özdemir & Kıroğlu, 2021), it was concluded that as the grade level increases, the attitude toward reading increases. In other studies (McCoy et al., 1991; Hayes, 2000; Keleş, 2006; Suna, 2006; İşeri, 2010; Baş, 2012), it was found that the attitude toward reading progressed negatively as the grade level increased. This can be explained by the different study groups. Because it is normal for there to be a difference between the reading culture developed by middle school and high school students and the reading culture of university 3rd and 4th-grade students. The fact that this study worked with Turkish and classroom teacher candidates who will specialize in mother tongue education may also help in explaining the difference between this study and other studies in the literature.

Considering the relationship between reading attitude and reading speed and reading comprehension, studies on reading in educational environments should not be considered independent

of reading attitude. Reading speed and reading comprehension are very important in terms of developing reading habits and being an active reader. However, based on the results obtained in this study, reading speed and reading comprehension studies should be considered as a whole, not separately from reading attitude. In addition, the fact that environmental factors are also effective in reading comprehension (Çiğdemir & Akyol, 2022) should be taken into consideration.

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How Management Styles Predicts School Culture: A regression analysis study*

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Abstract

The purpose of this research is to determine the relationship between management styles and organizational culture in elementary schools. Relational survey model as a quantitative research methodology was employed in the study. The research population consists of 6058 school teachers working in public schools in Şahinbey and Şehitkâmil districts of Gaziantep in the academic year 2018-2019. The sample consists of 388 teachers determined by cluster sampling. The "Perceived Manager Management Style Scale" was used to measure management style, and the "Organizational Culture Scale" was used to measure organizational culture. As a result, it is found that school principals exhibit a collaborative management style and managers do not have authoritarian, resistant and indifferent management styles. Although supportive culture and success culture in schools were determined as dominant cultures, role and power culture was also in moderate levels. The views of male and female teachers about the sub-dimensions of administration style and organizational culture did not show significant difference yet, there are significant low and medium level relationships between management style sub-dimensions and organizational culture. Management style sub-dimensions are a significant predictor of organizational culture. Authoritarian management style had the highest correlation with power culture. Except for resistant management style, a significant relationship was found between management styles and success culture. Collaborative management style had the highest relationship with the culture of success. Collaborative management style had the highest relationship for management styles and support culture. One unit of change in the collaborativemanagement style predicted.51 units of change in the support culture.

Keywords: Management styles, Organizational culture, Predictive level.

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Introduction

With many different definitions in the literature, management is generally represented as the process of guiding human and financial resources in a productive way in line with an aim. Management is a case as old as the history of humanity and the differentiation of leaders and managing people can be traced from early periods to the present day. Stages of social life based on forms of production like the transition to settled life, agricultural societies, industrial societies, and scientific and technological developments have ensured the development of management as an academic discipline and led to great changes in the theoretical basis of the organization concept.

Variables like organizational structure, areas of activity, features of employees, and forms of understanding of managers emerge in different management practices and are called 'management style'. Different management styles form a topic of academic studies from this aspect. Organizational culture may be defined as all the values and norms shared by members of an organization. Managers may change the traditions, rules and values of the organization they manage with the managerial behavior they display. In this sense, the management styles displayed by managers can be said to affect the culture of the organization.

Management

Generally, a scientific branch investigating the managerial operations and activities in all types of operations and organizations, management has shown large advances in a theoretical sense since the beginning of the 20th century. Management, with aims like ensuring high productivity and maximizing profits while achieving organizational targets, may be qualified as a young discipline within the social sciences.

Management was defined in different ways by several domestic and international authors. Organizations comprise people coming together to achieve a common aim. Managers are people who organize employees and motivate them in line with organizational aims. In this context, management is a group activity involving people coming together to achieve organizational targets (Eren, 1993). According to another definition, management is the activity of coordinating resources through management processes such as planning, organizing, directing and controlling in order to achieve the organizational aims (Ergun &Polatoglu, 1992). When the common points of these definitions are investigated, factors like unity of purpose, human relationships and management processes emerge.

The first views about management extend back to ancient Egyptian and Babylonian civilizations. A variety of thoughts about state management especially were shared and discussed in ancient China, Greece, and Rome, and in the Seljuk and Ottoman periods. The economic, social and political developments in the industrial revolution experienced in the 18th century prepared the way

for the emergence of new management understandings (Ozer,Akcakaya, Yayli&Batmaz, 2015). After the civil war in the United States, there was a need for development of the public sector and reforms proposed by USA President Wilson with the aim of developing the federal administration were applied to local administrations over time and ensured the development of management as a scientific branch (Tortop, İsbir&Aykac, 1993).

Three basic factors played important roles in the development of management as a scientific branch. These factors are the industrial revolution, world wars and developments in the scientific and technological fields. Social transformations brought by the industrial revolution caused large changes to the qualities of the operation concept and discussions about productivity, motivation and participatory management led to the emergence of ideas and paradigms strengthening management science. The second factor of world wars ensured the application of new methods and techniques in working life. Finally scientific and technological developmentsadvanced management science through many inventions and innovations (İpek, 2016).

Management Style

The basic duty of a manager is to achieve the aims of the organization they manage. The main topic of management is what the manager must do and what path they should follow to achieve the organizational aims (Ozgur, 2011). In this context, management style is a concept affected by many elements like personal traits, world view, organizational structure and qualities of the work, which also affect the decisions of the manager.

Management style affects the behavior of employees. The management style of a manager is a function involving many components like behavior, personality and experience. Management style is also important in terms of being able to cope with problems in working life (Barutcugil, 2002). The broad concept of management style encompasses management processes like organization, planning, staffing and control (Wu, Chiang & Jiang, 2002).

The literature states that there is no single and universal management style that can be applied in organizations, and that there are different management styles which vary according to diverse factors (Poon, Evangelista &Albaum 2005). These factors determining management styles may be explained as organizational culture, information and skill levels of managers and features of employees.

Management style includes all elements related to the decision-making processes of managers as stated in one definition of management(Albaum, Herche, Yu, Evangelista, Murphy & Poon, 2007). A more comprehensive and different definition of management style states it involves the beliefs and

behavior of managers, subordinate-superior relationships, ways of organizing work, and forms of reward, punishment and empowerment (Torre &Toyne, 1978).

Management styles were investigated from many aspects. Just as there are approaches dealing with management styles in terms of autocracy and participation (Key & Key, 2000), there are approaches dealing with them in terms of leadership (Ustuner, 2016). Though management styles are considered in terms of leadership, leadership and management are different concepts. Generally, a leader is a person who gathers a group around certain aims, motivates them through their influence, guides their followers, and has targets, vision and influence (Engin, 2007). A manager is 'a person who works on behalf of others, strives to achieve predetermined goals, plans work, gets things done, and oversees results' (Sabuncuoglu&Tuz, 1995).The most important difference between leadership and management is the source of power that leaders and managers use to influence others (Aydin, 2013). Leaders and managers use different sources of power. Being a leader is not about using authority. Exercising authority is a managerial action performed by managers and involves their right to give an order which is granted by legal regulations (Aydin, 2013).

Organizational Culture

The source of the concept of culture is based on the word 'colere' in Latin involving different meanings like "to care for, to inhabit, to protect". This word later was seen in Western languages and transformed into the English word "cultivation" in the sense of "agriculture". The "culture" word was used in the sense of 'cultivation of the mind' over time (Harvey &Stensaker, 2008).

Organizational culture studies first began with an article published by Pettigrew in 1979 in an academic journal called "Administrative Science Quarterly". Previously this concept, called "organizational climate" by Blake and Mouton, was called "corporate culture" in an article by Silverzweig and Allen in 1976. The concept became popular in the 1980s and entered the European scientific literature after the USA. It is proposed that the increase in organizational culture studies is based on two important reasons. The first is the economic crisis causing large changes in organizations in the 1970s. The second reason is the "Japanese miracle" in the economy in the same period, when Japan became a superpower in an economic sense as Japanese companies overtook the superiority of American companies in many fields. The need to understand the causes underlying this success story directed academics and researchers to study organizational culture (İpek, 1999).

There are many different definitions of organizational culture. According to Pettigrew (1979), who first mentioned organizational culture, organizational culture is defined as a "system of meaning accepted and shared by a group". According to another definition, organizational culture is a phenomenon that teaches behavior patterns and the meaning of success and failure(Tierney, 1997).

Organizational culture encompasses forms of doing work in an organization and the organizational features shared by members of the organization. From this aspect, organizational culture ensures representation of employees' thoughts about an organization and is important in terms of creating a common identity (Balay, 2014). Many studies were performed about organizational culture models. Some of these include organizational culture models developed by Edgar Schein, Bath Consultancy Group and Diana Pheysey(İpek, 2004).

Schein modeled culture at three levels of artifacts, values and basic assumptions. Artifacts are noticeable elements of a culture like technology and art. Values, criteria of goodness or badness of basic beliefs of an organization, involve cultural learning. When an organization encounters a problem, solutions are proposed for the problem and if the proposal is successful, it may gain the quality of being a value. Basic assumptions involve the pre-acceptance of successful solutions continuously applied to problems. Basic assumptions, defined as 'theories in use' by Argyris, are assumptions showing how group members will perceive, think and feel about events and which direct their behavior from this aspect (Schein, 2004). The Bath Consultancy Group developed a new organizational culture model based on studies by Geertz and Schein by analogy to a "water lily". In this model, organizational culture comprises five levels of artifacts (symbols), behavior, worldview, emotional grounding and motivational roots (Hawkins, 1997).

Management styles play an important role in the formation of culture and continuation or development of a pre-existing culture. Authoritarian management styles develop power and role cultures, while collaborative management styles will develop a support culture and a success culture. Just as indifferent and resistant management styles do not have a support culture, they will not be seen in school success. Many models were created for organizational culture. In this study, the organizational culture modeling by Pheysey (1993), considered to be able to form relationships with management styles, was chosen. Pheysey (1993) investigated organizational culture at four levels of role, success, power and support culture. Organizations with role culture have a pyramid-shaped hierarchical structure. Work definitions, rules, behavior and wage principles are determined. In success culture, the focus is more on the work to be done rather than the rules to be followed. In operations dominated by success culture, employees are satisfied with the work and tasks performed by spending their energy and time on success. Power culture collects all authority in the hands of management. The basic features of this culture are respect for authority, strong leaders, and compliant members. In organizations with support culture, members have a strong sense of belonging and commitment to the organization. These types of organizations bring human relationships to the fore. Examples include role culture seen in state institutions, success culture in research institutions, power culture in mafia organizations and support culture in revolutionary committees.

In this study about the prediction levels of school principal management styles for organizational culture in schools, the management style subdimensions of collaborative, authoritarian, indifferent and resistant were considered. The collaborative management style is a management style based on organizational leadership where school principals produce common solutions to problems with teachers. In this management style, school principals encourage teachers and provide the necessary environment for them to be successful (Ustuner, 2016). The authoritarian management style is based on pressure and punishment. In this approach, the school principal thinks with a focus on outcomes and attaches importance to shape and behavior (Ozgur, 2011). The indifferent management style is a management style where school principals leave teachers and other school personnel to their own devices. The school principal avoids determining targets and making decisions. From this aspect, it is a management style causing low efficiency in group work (Kahraman, 2019). The resistant management style is a management style where the manager displays an attitude increasing difficulties instead of solving problems. The basis of this management style is suspicion and distrust (Ustuner, 2016).

The aim of this research was to determine the prediction level of management styles for organizational culture. The answers to the following questions were sought in order to achieve this aim.

1. According to teacher perceptions, what is the management style of school principals and the organizational culture of schools?
2. According to teacher perceptions, are there significant differences in the management style of school principals and organizational culture of schools based on teacher gender, total duration of service and duration of service in the school?
3. Do management styles predict organizational culture?

Method

This research aims to determine the prediction level of management style for organizational culture.Relational survey model as a quantitative research methodology was employed in the study. The target population of the research comprised 6058 middle school teachers employed in public elementary schools in Şahinbey and Şehitkâmil counties of Gaziantep province in the 2018-2019 educational year. As it was not possible to reach the whole population, appropriate sampling method was applied. In the .95 confidence interval with target population of 6058 teachers, 388 teachers was chosen with the cluster sampling method (Balci, 2018).

Firstly, the sample was divided between Şahinbey and Şehitkâmil counties. Then schools were identified based on the number of teachers employed and schools with 50 or more teachers were

included in the sample. The sample comprised 420 teachers employed in 20 state middle schools with 10 schools located in Şahinbey and 10 in Şehitkâmil. The sample of 420 was cut to 388 due to variety of reasons. This number was accepted as sufficient for sample size.

Teachers were determined randomly. Large schools were chosen by considering the number of teachers when selecting the schools. The selection of schools with higher teacher numbers was assumed to be effective as teacher numbers affect management styles of school principals and organizational culture. Permission was granted by Gaziantep Provincial Directorate of National Education in order to apply the surveys. Data were collected by the researchers in person. Frequency and percentage values related to the demographic features of teachers participating in the research are given in Table 1.

Table 1. Percentage and Frequency Distribution of Participant Demographic Variables

Demographic Characteristic	Categories	f	%
Gender	Female	243	63.8
	Male	138	36.2
	Total	381	100.0
Total Duration of Service	1-5 years	139	36.5
	6-10 years	88	23.1
	11-15 years	63	16.5
	16 years or more	91	23.9
	Total	381	100.0
Duration of Service in School	1-2 years	137	36.0
	3-5 years	171	44.9
	6 years or more	73	19.1
	Total	381	100.0

As seen in Table 1, 63.8% of participants were women and 36.2% were men. Of teachers, 36.5% had total duration of service from 1-5 years, 23.1% from 6-10 years, 16.5% from 11-15 years and 23.9% 16 years or more. It appeared that 36% of participants had worked in their school for 1-2 years, 44.9% for 3-5 years and 19.1% for 6 years or more.

Data Collection Tools

The data collection tool comprised three sections. The first section included the Personal Information Form developed by the researchers, the second section included the Organizational Culture Scale developed by İpek (1999) and the third section included the Perceived SchoolPrincipal Management Style Scale developed by Ustuner (2016). The personal information form comprises the variables of gender, total duration of service and duration of service in the school. The Organizational Culture Scale developed by İpek (1999) comprises 36 items and 4 dimensions. The scale dimensions are power culture, role culture, success culture and support culture. The reliability of the Organizational Culture Scale subdimensions was found to be .60 for power culture, .69 for role culture, .78 for success culture and .90 for support culture.

The Perceived School Principal Management Style Scale developed by Ustuner (2016) comprises 25 items and 4 dimensions. The scale dimensions are collaborative, authoritarian, indifferent and resistant. The reliability for the subdimensions of the Perceived Manager Management Style Scale was found to be .92 for collaborative management style, .89 for authoritarian management style, .86 for indifferent management style and .85 for resistant management style.

In order to use both scales in the research, necessary permissions were obtained from the authors by e-mail. The scales both have 5-point Likert ratings from "completely disagree (1)" to "completely agree (5)".

Data Analysis

Data for a total of 388 participants obtained as a result of the research were firstly investigated for missing data (Hair, Black, Babin& Anderson, 2014) and in terms of outlier (end data) values. As a result of the investigation, missing data was at levels lower than 3% for all variables. Missing data were overcome by taking the mean of the series for variables with continuous measurement levels. Additionally, as outlier values significantly affect the normal distribution of data, last data analysis was performed, and the decision was made to remove seven observational values with outlier values from the dataset. The analyses in the research were completed with data obtained from 381 participants.

Data were considered according to .05 significance level and .95 confidence interval. Opinions from 1.00-1.80 were evaluated as completely disagree, 1.81-2.60 were disagree, 2.61-3.40 were agree at moderate levels, 3.41-4.20 were agree and 4.21-5.00 were completely agree.

Before beginning tests, data were investigated for suitability for analysis and the normal distribution status of data was investigated to decide which of the "parametric" or "non-parametric" tests to use. Within this scope, the decision about whether data had normal distribution or not was made by examining skewness and kurtosis values. According to Gurbuz and Sahin (2018), if skewness and kurtosis values are between -1 and +1 it is accepted as an indicator of normality.

Evaluations about all scale items and subdimensions used arithmetic mean and standard deviation values. The t test was used to determine whether scale subdimensions differed significantly or not according to gender. The variation of subdimensions on the two scales according to total duration of service and duration of service in school was tested with one-way analysis of variance (ANOVA) and the post-hoc Tukey test was used to determine which groups caused the difference. Multiple regression analysis was performed to identify the level of prediction of management style dimensions for organizational culture subdimensions.

Pearson correlation analysis was applied with the aim of determining the correlation between management style and organizational culture values with multiple regression analysis. Correlations emerging from Pearson correlation analysis were evaluated as low with values from 0-0.29, moderate from 0.30-0.69 and high for values of 0.70 and above (Cokluk, Sekercioglu&Buyukozturk, 2014).

Findings

The mean and standard deviation values for items related to management styles and organizational culture that teachers agreed with most or least are given in Table 2.

Table 2. Descriptive Analysis Results for Management Styles and Organizational Culture SubDimensions

	Sub Dimensions	n	$\overline{X}$	S	Skewness	Kurtosis
Management Styles	Collaborative	381	4.16	.708	-.765	.343
	Authoritarian	381	2.38	.633	.222	.066
	Indifferent	381	1.70	.548	.326	-.789
	Resistant	381	1.88	.691	.460	-.034
Organizational Culture	Power	381	3.11	.599	-.109	.490
	Role	381	3.32	.502	.019	.507
	Success	381	3.53	.597	.160	.027
	Support	381	3.82	.671	-.314	.224

As seen in Table 2, teachers stated principals had collaborative management style ($\overline{X}$ =4.16), did not have authoritarian ($\overline{X}$ =2.38) and resistant ($\overline{X}$ =1.88) management styles with none having indifferent ($\overline{X}$ =1.70) management style.

Teachers agreed that schools had support ($\overline{X}$ =3.82) and success culture ($\overline{X}$ =3.53), while they agreed at moderate levels that schools had role culture ($\overline{X}$ =3.32) and power culture ($\overline{X}$ =3.11). When the skewness and kurtosis values in Table 2 are investigated, data appeared to have normal distributions these values were between ±1 for all dimensions.

Findings Related to Gender Variable

The independent groups t test was applied with the aim of identifying whether perceptions about management styles and organizational culture of teachers differed at significant levels according to gender. The t test results for management style and organizational culture subdimensions according to gender are given in Table 3.

Table 3. T-Test Findings for Management Style and Organizational Culture SubDimensions According to Gender

Dimensions	Sub Dimensions	Gender	n	$\overline{X}$	S	t	p
Management Styles	Collaborative	Female	243	4.1344	.71800	-1.060	.290
		Male	138	4.2135	.69220		
	Authoritarian	Female	243	2.3676	.63554	-.503	.615
		Male	138	2.4012	.63219		
	Indifferent	Female	243	1.6905	.51544	-.669	.504
		Male	138	1.7292	.60280		
Organizational Culture	Resistant	Female	243	1.8852	.66400	-.063	.950
		Male	138	1.8898	.73948		
	Power	Female	243	3.1374	.60984	.979	.328
		Male	138	3.0756	.58098		
	Role	Female	243	3.3308	.52254	.239	.811
		Male	138	3.3181	.46876		
	Success	Female	243	3.5278	.59315	-.226	.821
		Male	138	3.5420	.60572		
	Support	Female	243	3.8503	.66961	.847	.398
		Male	138	3.7905	.67413		

When Table 3 is examined, the opinions of teachers about management style and organizational culture subdimensions did not differ at significant levels according to the gender variable ($p<.05$).

ANOVA Findings

ANOVA was applied with the aim of identifying whether perceptions about management style and organizational culture of participants in the research differed at significant levels according to total duration of service and duration of service in the school.

Before beginning the analysis, homogeneity of variance, a precondition for ANOVA, was examined. As a result of the analysis, variance for both total duration of service and duration of service in the school variables had homogeneous distribution ($p>.05$). The ANOVA results for management style and organizational culture subdimensions according to total duration of service are given in Table 4.

Table 4. ANOVA Findings for Management Style and Organizational Culture SubDimensions According to Total Duration of Service

	Sub Dimensions	Categories	n	$\overline{X}$	S	F	p
Management Styles	Collaborative	1-5 years	139	4.1073	.72346	1.53	.207
		6-10 years	88	4.0879	.69499		
		11-15 years	63	4.3063	.63273		
		16 years or longer	91	4.1980	.74464		
		Total	381	4.1587	.71016		
	Authoritarian	1-5 years	139	2.4002	.58724	4.06	.007*
		6-10 years	88	2.4303	.61009		
		11-15 years	63	2.1303	.65177		
		16 years or longer	91	2.4594	.67866		
		Total	381	2.3768	.63422		
	Indifferent	1-5 years	139	1.6461	.52704	5.57	.001**
		6-10 years	88	1.7061	.47818		
		11-15 years	63	1.5617	.41938		
		16 years or longer	91	1.8862	.66957		
		Total	381	1.7049	.55097		
	Resistant	1-5 years	139	1.9432	.72252	3.05	.028*
		6-10 years	88	1.9275	.70009		
		11-15 years	63	1.6516	.56823		
		16 years or longer	91	1.9372	.68594		
		Total	381	1.8901	.69080		
Organizational Culture	Power	1-5 years	139	3.1410	.56064	.42	.732
		6-10 years	88	3.0629	.55478		
		11-15 years	63	3.1538	.65964		
		16 years or longer	91	3.0920	.64755		
		Total	381	3.1141	.59778		
	Role	1-5 years	139	3.3720	.49618	1.30	.273
		6-10 years	88	3.3712	.47024		
		11-15 years	63	3.2617	.52405		
		16 years or longer	91	3.2720	.53584		
		Total	381	3.3286	.50627		
	Success	1-5 years	139	3.4536	.51702	3.59	.014*
		6-10 years	88	3.4465	.61685		
		11-15 years	63	3.7026	.72346		
		16 years or longer	91	3.6032	.69499		
		Total	381	3.5305	.63273		
	Support	1-5 years	139	3.7675	.74464	3.29	.021*
		6-10 years	88	3.7317	.71016		
		11-15 years	63	4.0465	.58724		
		16 years or longer	91	3.8581	.61009		
		Total	381	3.8285	.67111		

*p<.05 Sd=373

When Table 4 is investigated, the authoritarian, indifferent and resistant subdimensions of management styles and success and support subdimensions of organizational culture displayed significant differences according to total duration of service of teachers (p<0.05). When the source of the difference is examined, teachers with total duration of service of 11-15 years found managers were less authoritarian ($\overline{X}$ =2.13; F=4.06; p<.05), less indifferent ($\overline{X}$ =1.56; F=5.57; p<.05) and less resistant ($\overline{X}$ =1.65; F=3.05; p<.05).

When organizational culture is examined, the subdimensions of power (F=.42 p>.05) and role culture(F=1,30 p>.05) did not display significant differences according to the total service duration of teachers. Additionally, there were significant differences for the success and support culture subdimensions according to the total employment duration of teachers (p<.05). When the success culture subdimension is examined, teachers with 11-15 years of total employment ($\overline{X}$ =3.70) agreed success culture existed in schools more compared to teachers with 1-5 years ($\overline{X}$ =3.45) and 6-10 years ($\overline{X}$ =3.44) of total employment (F=3.59; p>.01).

When the support culture subdimension is examined, teachers with 11-15 years ($\overline{X}$ =4.04) total employment agreed that schools had support culture more than teachers with other durations of employment (F=3.29; p>.05). The ANOVA results according to employment duration in the school are given in Table 5.

Table 5. ANOVA Findings for Management Style and Organizational Culture Sub Dimensions According to Duration of Service in School

	Sub Dimensions	Categories	n	$\overline{X}$	S	F	p
Management Styles	Collaborative	1-2 years	137	4.1895	.68934	.999	.369
		3-5 years	171	4.1061	.73790		
		6 years or longer	73	4.2329	.67927		
		Total	381	4.1613	.70930		
	Authoritarian	1-2 years	137	2.3110	.60425	1.339	.263
		3-5 years	171	2.4296	.63246		
		6 years or longer	73	2.3874	.68462		
		Total	381	2.3783	.63366		
	Indifferent	1-2 years	137	1.6004	.47886	4.351	.014*
		3-5 years	171	1.7547	.57746		
		6 years or longer	73	1.7992	.58420		
		Total	381	1.7076	.54999		
	Resistant	1-2 years	137	1.8681	.65996	.834	.435
		3-5 years	171	1.9407	.71376		
		6 years or longer	73	1.8271	.68795		
		Total	381	1.8921	.68933		
	Power	1-2 years	137	3.1539	.59755	1.384	.252
		3-5 years	171	3.0632	.55794		
		6 years or longer	73	3.1814	.67218		
		Total	381	3.1194	.59675		
		1-2 years	137	3.4087	.50829	2.743	.066
		3-5 years	171	3.2883	.48174		

	Role	6 years or longer	73	3.2730	.54055		
Organizational		Total	381	3.3289	.50566		
Culture		1-2 years	137	3.5218	.50810	1.667	.190
		3-5 years	171	3.4957	.64103		
	Success	6 years or longer	73	3.6446	.64017		
		Total	381	3.5345	.59715		
		1-2 years	137	3.8855	.61533	4.811	.009*
		3-5 years	171	3.7133	.70807		
	Support	6 years or longer	73	3.9723	.64148		
		Total	381	3.8267	.66940		

*p<.05

When Table 5 is examined, it is seen that there is a significant difference for the indifferent management style among management style subdimensions according to duration of employment in school (F=4,35; p<.05). When the source of the difference is examined, teachers with 1–2-year seniority ($\overline{X}$ =1.60) stated principals displayed less indifferent management style compared to teachers in the 3-5 years ($\overline{X}$ =1.75) and 6 years and longer ($\overline{X}$ =1.79) groups.

Teacher opinions about the support culture subdimension differed according to duration of service in the school (F=4.81; p<.01). Accordingly, teachers with 6 years or more ($\overline{X}$ =3.97) duration of employment agreed that there was more support culture in schools compared to teachers with 3-5 years of employment ($\overline{X}$ =3.71).

Regression Analysis Findings

The regression analysis results showing the effects of management style subdimensions on power culture are given in Table 6.

Table 6. Multiple Regression Analysis Showing Effect of Management Styles on Power Culture

Variables	B	S.H.	β	t	p	Partial-r	Tolerance	VIF
Constant	1.888	.291		6.49	.000			
Collaborative	.167	.048	.198	3.46	.001	.174	.715	1.399
Authoritarian	.293	.052	.310	5.68	.000	.279	.783	1.277
Indifferent	-.195	.071	-.179	-2.75	.006	-.139	.552	1.810
Resistant	.088	.060	.101	1.45	.147	.074	.479	2.088
p<.01	F=11.60;	p=.000		R=.32	R^2=.10			

According to Table 6, there appears to be significant correlations between power culture and management styles (F=11.60; p<.001). When the R^2 value is examined, it appears management styles explain 10% of power culture (R^2=.108). Two-way comparison found significant correlations between power culture with collaborative, authoritarian and indifferent management styles (6>t<-3; p>.05).

When correlations are examined, the highest correlation was between power culture with authoritarian management style (partial r=.28). Additionally, this correlation was significant and positive, but at low levels. When the B value is examined, one-unit variation in the authoritarian management style caused a .29-unit variation in power culture. There appeared to be a significant, negative but low-level correlation between power culture with indifferent management style (partial r=-.14). When the B value is examined, one-unit change in the indifferent management style caused a .19-unit variation in power culture. There was a significant positive and lower correlation between power culture with collaborative management style (partial r=.17). When the B value is examined, one-unit change in the collaborative management style caused a .17-unit change in power culture. There was no significant correlation between power culture with the resistant management style (p<.05).

When beta values are examined, authoritarian management style (β=.31) was the most effective on power culture, followed by collaborative (β=.20), indifferent (β=.18) and resistant (β=.10) management styles. It appeared there was no collinearity in our model (TV<1.00; VIF<10). The regression analysis results for the effect of management styles on role culture are given in Table 7.

Table 7. Multiple Regression Analysis Showing Effect of Management Styles on Role Culture

Variables	B	S.H.	β	t	p	Partial r	Tolerance	VIF
Fixed	2.023	.234		8.631	.000			
Collaborative	.228	.039	.321	5.849	.000	.286	.715	1.399
Authoritarian	.232	.042	.293	5.587	.000	.275	.783	1.277
Indifferent	-.271	.057	-.296	-4.738	.000	-.235	.552	1.810
Resistant	.140	.049	.193	2.875	.000	.145	.479	2.088
p<.01	F=20.49;	p=.000		R=.420	R^2=.176			

According to Table 7, there was a significant correlation between role culture and management styles (F=20.49; p<.01). When the R^2 value is examined, it appears management styles explained 18% of role culture (R^2= .176). When the t values are examined, two-way analysis found that each management style predicted role culture separately (2.00<t>9.00; p<.05). There were significant but low-level correlations between role cultures and management styles (p<.001).

When correlations are examined, the highest correlation was between role culture and the collaborative management style (partial r=.29). Additionally, this correlation was significant, positive and low. When the B value is examined, oneunit of change in the authoritarian management style caused .23-unit variation in role culture.

In second place for role culture, the highest correlation was with authoritarian management style (partial r=28). This correlation was significant, positive and low. The next correlation in third

place for role culture was with the indifferent management style. There was a significant, negative and low correlation between role culture with indifferent management style (partial r=-.24). When the B value is examined, one-unit change in the indifferent management style caused .27-unit variation in role culture.

The lowest correlation with role culture was for the resistant management style. There was a significant, positive but low correlation between role culture and resistant management style (partial r=.15). When the B value is examined, oneunit of change in the resistant management style caused a .14-unit variation in role culture.

When the beta values are examined, the management styles most effective on role culture were collaborative (β=.32), followed by indifferent (β=.30), authoritarian (β=.29), and resistant (β=.19). Our model did not appear to have collinearity (TV<1.00; VIF<10). The regression analysis results showing the effects of management styles on success culture are given in Table 8.

Table 8. Multiple Regression Analysis Showing Effect of Management Styles on Success Culture

Variables	B	S.H.	β	t	p	Partial r	Tolerance	VIF
Fixed	1.604	.232		6.901	.000			
Collaborative	.488	.039	.579	12.650	.000	.543	.715	1.399
Authoritarian	.115	.041	.123	2.800	.005	.142	.783	1.277
Indifferent	-.244	.057	-.225	-4.310	.000	-.215	.552	1.810
Resistant	.020	.048	.024	.422	.673	.022	.479	2.088
p<.01	F=70.96;	p=.000		R=.652	R^2=.426			

According to Table 8, there was a significant correlation between success culture with management styles (F=70.96; p<.001). When the R^2 value is examined, it appeared management styles predicts 43% of success culture (R^2=.426). Looking at the t values, two-way assessments found that, apart from the resistant management style, all other management styles separately predicted success culture (.40<t>13,00; p<.05).

When correlations are examined, apart from resistant management style, there were significant correlations between success culture with the other management styles (p<.001).The highest correlation with success culture was for the collaborative management style (partial r=.54). There was a significant, positive and moderate level correlation between success culture and collaborative management style. When the B value is examined, one-unit change in the collaborative management style caused a .49-unit change in success culture. The second-highest correlation with success culture was for the indifferent management style (partial r=-.22). This correlation was significant, negative and low-level. When the B value is examined, a one-unit variation in the indifferent management style caused a .24-unit variation in success culture. The lowest correlation with success culture was for the authoritarian management style. There appeared to be a significant,

positive and low correlation between success culture and authoritarian management style (partial r=.14). When the B value is examined, a one-unit change in the authoritarian management style caused a .11-variation in success culture.

When beta values are examined, the highest effect on success culture was from collaborative management style (β=.58), followed by indifferent (β=.23) and authoritarian (β=.12) styles. Our model did not appear to have collinearity (TV<1.00; VIF<10). The regression analysis result for the effects of management styles on the support culture dimension are given in Table 9.

Table 9.Multiple Regression Analysis Showing Effect of Management Styles on Support Culture

Variables	B	S.H.	β	t	p	Partial r	Tolerance	VIF
Fixed	2.179	.260		8.370	.000			
Collaborative	.508	.043	.537	11.760	.000	.515	.715	1.399
Authoritarian	-.018	.046	-.017	-.392	.695	-.020	.783	1.277
Indifferent	-.241	.063	-.197	-3.793	.000	-.190	.552	1.810
Resistant	-.007	.054	-.007	-.125	.900	-.006	.479	2.088
p<.01	F=72.15;	p=.000		R=.656	R^2=.430			

According to Table 9, there appears to be significant correlations between support culture and management styles (F=72.15; p<.001). When the R^2 value in Table 9 is examined, management styles explained 43% of the support culture (R^2= .430). When the t values are examined, two-way assessment shows that collaborative and indifferent management styles predicted support culture (-3.70<t>12.00; p<.001).

When correlations are examined, collaborative and indifferent management styles appeared to be significantly correlated with support culture (p<.001). The highest correlation with support culture was for the collaborative management style (partial r=.51). There was a significant, positive and moderate level correlation between support culture and collaborative management style. When the B value is examined, one-unit change in collaborative management style caused a .51-unit change in support culture. The second highest correlation with support culture was from the indifferent management style (partial r=-.19). This correlation was significant, negative and low-level. When the B value is examined, oneunit of change in the indifferent management style predicted.24-unit variation in support culture. When the beta values are examined, the highest effect on support culture was from the collaborative management style (β=.54), followed by the indifferent management style (β=.20). Our model did not appear to have collinearity (TV<1.00; VIF<10).

Discussion, Conclusion and Recommendations

The following results were reached in this research aiming to determine the prediction levels of management styles for organizational culture. Elementary school principals displayed collaborative management style. Principals did not have authoritarian, resistant or indifferent management styles.

Research by Abdurrezzak&Ustuner (2020) observed that collaborative management styles were very high among principals, while authoritarian management style was low and indifferent and resistant management styles were very low, in parallel with the results of our research questions(Abdurrezzak&Ustuner, 2020). In the study by Gedik&Ustuner (2019), teachers stated that principals generally used collaborative management style. The research results revealed that authoritarian, indifferent and resistant management styles remained at low levels. In other studieson managementstyle, schoolprincipals' appeared to be adequate in terms of management, display democratic management style more (Terzi & Kurt, 2005). They had highest averages for collaborative-democratic management style with moderate levels (Ozdemir, Kartal&Yirci, 2014) or low levels (Argon &Dilekci, 2014; Abdurrezzak & Ustuner, 2020) of authoritarian, indifferent and resistant management styles. The results of this study are compatible with results in the literature. Principals in schools displaying collaborativemanagement style is a situation which should be appreciated.

Schools are dominated by support and success culture, with moderate levels of role and power culture. Studies by İpek (1999) and Terzi (1999) in 1997-1998 in public and private high schools are compatible with each other, though different from our research results. The research by Terzi concluded that the most dominant organizational culture in state and private high schools was power culture. In the research by İpek, organizational culture in state high schools was primarily power culture, then role culture, followed by success and support culture. In private high schools, primarily success and power culture were present, followed by support and role culture (İpek, 1999). In this research, primarily support and success culture were present as organizational cultures in schools.

In research by Kahveci in 2015 about primary, middle and high schools, teachers had good perceptions of organizational culture, high perceptions of organizational trust, and low perceptions of alienation and organizational cynicism (Kahveci, 2015). In a study by Ozturk in 2015, teachersgenerally found their school principals were positive, while teachers found their teacher colleagues to be open to cooperation and supportive (Ozturk, 2015). Research by Kilic in 2018 found support culture was the highest determinant of school culture (Kilic, 2018). Again, in research by Sari and Helvaciin 2019, the most common organizational culture in schools was support culture according to teacher opinions, with role culture in second place, success culture in third place and power culture in last place (Sari &Helvaci, 2019). While power culture was ahead in research by İpek and Terzi, support culture was the highest among organizational cultures in schools in this research and research by Ozturk (2015), Kilic (2018), and Sari &Helvaci (2019). Second place went to success culture, while power culture, leading in research by İpek and Terzi, came last. The research results are significant in terms of showing that among organizational culture in schools, support culture developed from the years 1990-2000 to 2015-2020.

Schools, which transfer culture and are the gateway to knowledge, are organizations where support and success culture should dominate. Schools with developed support and success culture are necessary to prepare the environment needed for development of the knowledge and skills of teachers and students and to achieve success in this environment. Additionally, the role and power culture in schools, though at moderate levels, may be due to some managers still having a Taylorist view or classic management understanding. In this approach, management involves tight auditing, control and orders. The best management style is one that is authoritarian, looks from above, gives orders, searches for openings and preserves distance. It means that consulting with employees, laughing at them, causes slacking and procrastination.

In this research, opinions of female and male teachers about management style and organizational culture subdimension did not differ at significant levels. Similar results were found in research by Gedik and Üstüner (2019). In the research by Gedik and Ustuner (2019), there were no significant differences according to gender of teachers for principal management styles(Gedik ve Ustuner, 2019). Research by Arslan, Kuru&Satici (2005) about organizational culture found the opinions of primary level teachers did not differ according to gender, in parallel with the results of our study, while the opinions of secondary level teachers were significantly different. These differences were observed in the ceremonies, meetings, language and material culture subdimensions in secondary level schools(Arslan, Kuru &Satici, 2005).

Teachers with total duration of employment of 11-15 years in the research agreed less that managers had authoritarian, indifferent and resistant management styles compared to teachers with other durations of employment. Again, teachers with 11-15 years total employment agreed more that schools had success and support culture compared to teachers with other durations of service. The differentiation of opinions of teachers with 11-15 years of total employment in a positive sense for both management style and organizational culture is interesting, but the cause of this could not be understood.

Teachers with 1-2 years duration of employment in their school agreed less that managers in schools displayed indifferent management style compared to teachers working in their schools for 3 years or more. The reason for this may be due to managers paying more attention to teachers who are new to the school compared to those who have been there for longer. Just as it is a duty of managers to introduce new teachers to the school, introduce them to the teachers for socialization, ask how they are and pay attention to problems if present, it is a tradition of hospitality in Turkish culture. Additionally, research findings from Abdurrezzak and Ustuner (2020) did not find significant differences between the opinions of teachers about management styles of managers according to seniority.

Teachers with 6 years or more service in their schools agreed more that there was a support culture in schools compared to teachers with 3-5-years service. This situation may be due to teachers employed in the same school gaining increasing friendships with each other through the years, and receiving more support from each other compared to teachers with 3-5-years service. Teachers working in their school for 1-2 years may be supported more both among themselves and from experienced teachers because they are new. However, teachers with 3-5-years service may be considered not have formed settled friendships with other teachers and not to receive sufficient support as they are undecided about requesting a transfer elsewhere or staying in the school.

There was a significant but low-level correlation between management style subdimensions and power culture. The highest correlation with power culture was for the authoritarian management style. All management style subdimensions, apart from resistant management style, had significant correlations with power culture. There were positive correlations with power culture for management styles, apart from the indifferent management style. One unit of increase in the authoritarian management style predicted a .29-unit change in power culture. The subdimensions of management styles explained 10% of power culture. The greatest effect on power culture was from the authoritarian management style, followed by the collaborative, indifferent and resistant management styles.

There were positive correlations between role culture and management styles. The highest correlation with role culture was for the collaborative management style, followed by authoritarian, indifferent and resistant management styles. There were significant, positive (apart from indifferent management style) and low-level correlations between role culture and management styles. A one-unit increase in the collaborative and authoritarian management styles predicted a .23-unit increase in role culture. A one-unit increase in the indifferent management style predicted a .27-unit reduction in role culture. Role culture was mostly affected by collaborative management style, followed by indifferent, then authoritarian and finally resistant management style. Management style subdimensions explained 18% of role culture.

Management style subdimensions were important predictors of success culture. Apart from the resistant management style, there were significant correlations between other management styles and success culture. The highest correlation with success culture was shown by the collaborative management style at moderate levels. The other management styles had low-level correlations. Success culture had a negative and low-level correlation with the indifferent management style. There was a positive but low-level correlation with authoritarian management style. A one-unit increase in the collaborative management style predicted a .49-unit increase in success culture. A one-unit increase in the indifferent management style predicted a .24-unit decrease in success culture. Success

culture was primarily affected by the collaborativemanagementstyle followed by the indifferent and finally authoritarian management styles. Management styles explained 43% of success culture.

Management styles were significant predictors of support culture. There were significant correlations between collaborative and indifferent management styles with support culture. There was a significant, positive and moderate level correlation between collaborative management style with support culture. One-unit variation in collaborative management style predicted a .51-unit variation in support culture. There was a significant, negative and low-level correlation between the indifferent management style with support culture. A one-unit change in indifferent management style predicted a .24-unit reduction in support culture. Management style subdimensions explained 43% of support culture. The highest correlations for management styles were for success and support culture.

Direct studies researching the correlation of management styles with organizational culture could not be reached, both foreign and domestic. Additionally, research about the correlations of these two topics with other variables are available. For example, Kaymaz (2019) observed a positive significant and low-level correlation between success culture and work satisfaction and a positive significant and moderate-level correlation between support culture and work satisfaction in research investigating the effects of organizational culture on work satisfaction. In this study, significant, positive and moderate-level correlations were found between success and support culture with collaborative management style. In parallel with this research, research by Niemann and Kotze found a significant correlation between positive leadership with solidarity culture (Niemann & Kotze, 2007). Research by Turan&Bektas (2013) concluded that creation of a school culture strong in the leadership styles of guidance, creating a vision, encouraging and stimulating followers provided significant positive contributions(Turan&Bektas, 2013). Leadership requires influencing subordinates to receive their support and managing in cooperation with them. Abdurrezzak and Ustuner (2020) revealed that collaborativemanagement style was a more significant predictive variable influencing the commitment of teachers compared to authoritarian, indifferent and resistantmanagement styles (Abdurrezzak&Ustuner, 2020). According to these results, the following recommendations are made:

1. In the research, schools were found to have moderate levels of role and power culture. Workshop studies may be given to principalsfor further development of support and success culture in schools.
2. In the research, the collaborative management style was an important predictor of support and success culture. To increase support and success culture in schools, principals may be shown how collaborative management style works with both good practical examples and applied in workshop studies.

3. The research was performed in state middle schools. It is recommended to repeat the research in different educational organizations and stages like high school and primary school, in addition to private schools.
4. The research was completed as a quantitative study. Qualitative studies or mixed studies using both quantitative and qualitative methods may be performed about the same topic.

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A Validity and Reliability Study on Developing a Scale for Assessing Classroom Teachers' Attitudes Towards Illustrated Children's Books

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Abstract

The aim of this research is to create a scale to assess classroom teachers' attitudes towards illustrated children's books and to reveal the psychometric aspects of the scale. Between September 13th and December 22nd, 2021, data for the study were collected from classroom teachers in various provinces of Turkey via social networks. Data were collected from a total of 819 people, 517 of whom were included in the exploratory factor analysis in the first stage, while 302 of whom were included in the second-order confirmatory factor analysis (CFA) in the second stage. The exploratory factor analysis (EFA) done with the first sample group yielded a three-component construct with 20 items, ensuring the construct validity of the scale. A second-order CFA was conducted using the second sample group to give evidence for the construct. The convergent validity of the scale was examined with the average variance extracted (AVE) and combined reliability (CR) values, while the divergent validity of the scale was examined by comparing the $\sqrt{AVE}$ values with the correlation coefficients among the factors. Cronbach's alpha coefficient (Cr α) and combined reliability (CR) values were used to assess the scale's reliability. The scale was found to be valid and reliable in measuring classroom teachers' attitudes regarding illustrated children's books as a result of these examinations.

Keywords: Attitude scale, classroom teachers, illustrated children's books.

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Introduction

Illustrated children's books are considered as books that attract readers' attention with several visuals and a short-text narrative structure in a way as to enable them to focus on reading (Dockett, Perry & Whitton, 2006). In such publications, which are supposed to be as attentively prepared as those prepared for adults, the presence of artificial teaching, in which dry and childlike narration is dominant, may weaken the relationship between the child and the book in the course of time (Oğuzkan, 2006, p. 3; Sever, 2008). With the availability of quality books, children are likely to gain more knowledge and experience as well as the opportunity to learn to make connections between their experiences and their own lives, to look at life from different perspectives, to cope with different situations, and to develop their personalities (Erbaş, 2019; Gönen & Veziroğlu, 2013; Işıtan & Gönen, 2006). The relationship between children and books, which often begins at an early age with illustrated children's books, reinforces children's love of books and foster the culture of reading (Bilgin, 2011). Baccus (2004) found that teachers' experiences with reading books and providing orientation to students are influential in motivating students to read books. In the study of Myette (2006), the researcher stated that teachers are effective in inculcating reading habits in students. Arıcı (2005) similarly reported that 57.3% of the students got the idea of reading a book from their teacher, and 35.4% of them were given their first book by their teacher. Research also shows that the students taught by a teacher who reads a lot exhibit similar reading behaviour (Von Sprecken & Krashen, 1998). Such studies, which point to the fact that teachers have great responsibilities in creating a reading culture in children, also emphasize the relevant qualifications of teachers. Ateş (2021, p.345-346) stated that the students of teachers who regularly read books with children, are familiar with a wide variety of genres, and follow the newly released books will also be interested in books, and in addition to that, teachers' reading behaviour, their interest in reading, the kind of reading culture they possess, and what they know about the world of books- especially of children's books- will also be effective on students' reading culture.

In the international literature, this situation is expressed with the concept of the Peter Effect (Applegate & Applegate, 2004, p.561), claiming that "one cannot be expected to give what one does not possess". Teachers must be equipped with the necessary knowledge, skills and attitudes in order to guide their students successfully in the educational environment (Kılıç, 2007, p.137). It is believed that the positive attitudes that teachers may develop towards illustrated children's books will turn out to be effective to inculcate a love of books and reading culture in their students since teachers will become more likely to make use of such books in their classrooms as a natural result of the positive attitude. The three-component structure of attitude as cognitive, affective and behavioural was first defined by Smith (1947). Brecker (1984) stated that the cognitive component includes knowledge structures related to perceptual reactions and thoughts, the affective component includes reactions

related to emotions and excitement, and the behavioural component includes explicit actions and implicit tendencies (as cited in Erkuş, 2003). Spite of the fact that the literature has a diversity of definitions for attitude, it is widely agreed that attitude refers to the inclination to react positively or adversely to a stimulus or object (Beyer et al., 2015; Cohen & Swerdlik, 2015). According to relevant research (Handayani, Kosnin, Jiar & Imhonde 2011; Vogel & Wanke, 2016), having a positive attitude towards an object means showing positive behaviours towards that object, and having a negative attitude means negative behaviours towards that object.

There are no studies in the international literature that have been conducted with the goal of developing an attitude scale about illustrated children's books and children's literature, whereas there are several studies in the national literature that have been conducted on scales regarding prospective teachers' attitudes toward children's literature and undergraduate children's literature courses. However, an attitude scale towards illustrated children's books has not been found in the national literature either.

In this framework, Karagül (2020) developed a five-point Likert type scale to reveal the attitudes of prospective teachers towards children's literature. The scale consisted of 26 items, 18 of which were positive and 8 of which were negative, along with 3 factors, namely, awareness, appreciation and acceptance. Those three factors (1st factor 27.47%, 2nd factor 9.77%, and 3rd factor 7.57) proved to meet 44.82% of the explained variance, and the item test correlations ranged from .19 to .57. While the Cronbach's alpha reliability coefficient for the whole scale was .88, it was .86, for the first factor (awareness), .83 for the second factor (appreciation), and .75 for the third factor (acceptance). No information could be found about the CFA of the scale in the study.

The Attitude Scale towards Children's Literature was developed in Bağcı (2007)'s study to measure prospective Turkish teachers' attitudes about children's literature and children's literature courses. There were 35 items on a five-point Likert scale. The Cronbach's alpha reliability coefficient for the entire scale was found to be .80. The percentage and frequency values of the questions in the scale were determined as to the item analysis. No information was contained in the scale as regards item-test correlation, nor in relation to EFA and CFA.

Because no scales of attitude toward illustrated children's books have been found directly in the national and international literature, the current study is believed to be the first in the field.

Method

Sample Group

This study was conducted with two different sample groups in two different stages, in which 517 people were included for the EFA in the first stage and 302 people for the second-order CFA in the second stage. The demographic distribution of the participants is presented in Table1.

Table 1. Participants' demographic data

		Sample 1		Sample 2	
		f	%	f	%
Gender	Female	350	67.7	205	67.9
	Male	167	32.3	97	32.1
Length of service	0-5 years	109	21.1	71	23.5
	6-10 years	102	19.7	43	14.2
	11-15 years	54	10.4	53	17.5
	16-20 years	39	7.5	61	20.2
	20 years and over	213	41.2	74	24.5
Educational background	Associate degree	25	4.8	16	5.3
	Bachelor's degree	427	82.6	248	82.1
	Master's degree	61	11.8	36	11.9
	PhD degree	4	0.8	2	0.7

Scale Development Process

The relevant literature related to attitude towards illustrated children's books was reviewed via Google Scholar, YÖK Thesis Center, PROQUEST, SOBIAD, TOAD, Web of Science, and ERIC by focusing on the following key words: "attitude scale for illustrated children's books, attitude scale for children's books, illustrated children's books and attitude, attitude scale towards illustrated children's books, attitude scale towards picturebooks, attitude and picturebooks, attitude and illustrated children's books, attitude scale towards children's literature, attitude and children's literature, scale and picturebooks, scale and illustrated children's books". In the national literature, there were several scales connected to prospective teachers' attitudes toward children's literature and undergraduate children's literature courses, but no scales related to attitudes about illustrated children's books were found in the international literature. Besides that, no relevant scales were found that directly measures the attitudes of classroom teachers towards illustrated children's books.

As a consequence of the literature review, the scale's items were planned to be prepared. In this process, relevant literature as regards children's literature, illustrated children's books and attitude were taken into consideration in the item writing phase. While writing the items, the theoretical framework of the attitude and its cognitive, affective and behavioural sub-components were also taken into account. In the item pool consisting of a total of 62 items, 19 items were related to cognitive sub-component of attitude, 22 items to affective sub-component and 20 items to behavioural sub-component. In addition, on the basis of the view indicating that attitude is the reflection level of positive and negative emotions (Thurstone as cited in Erkuş, 2003), utmost attention was paid to include positive and negative expressions within the items. Consequently, 26 of the items contained negative statements, whereas 35 of them positive. Then, in order to evaluate the necessity, clarity and

originality of these statements, opinions were obtained from 6 experts, including 1 specialist in Turkish language, 4 specialist in classroom teaching field and 1 specialist in assessment and evaluation. Corrections were made in line with expert opinions, and 6 items containing ambiguous expressions were deleted, and a final trial form with 56 items was developed. The scale's items were scored using a five-point Likert scale (Strongly disagree with 1, disagree with 2, undecided with 3, agree with 4, strongly agree with 5).

Data Collection

The data were collected via Google Form from the first sample group within the period between 13 September and 3 November, 2021 and from the second sample group between 20 November and 22 December 2021 through online participation.

Data Analysis

Before starting the analyses, the data sets of both sample groups were examined to see if there were incorrect data entries, missing values, and extreme values. For extreme values, Z values and Mahalanobis Distance were examined. Six people in the first data set and five people in the second data set, who were outside the -4<Z<+4 range (Mertler & Vannata, 2005), had a value of $\alpha = 0.001$ in the Mahalanobis Distance analysis, and exceeded the critical $\chi 2$ value in the relevant degree of freedom (Tabachnick & Fidell, 2007), were not included in the analysis because they were outliers. The first data set, including 523 people in the first stage, was analysed as 517 participants, and the second data set, which was 307 people, as 302 participants with the exclusion of those with the extreme values. For the construct validity of the scale, first EFA and then second-order CFA were performed. The suitability of the data set for EFA was examined with KMO and Bartlett tests. Principal component analysis and the Varimax rotation method were used to uncover the scale's factor structure. Then, in order to test the accuracy of this structure, a second-order CFA was performed based on the maximum likelihood method. In the second-order CFA, fit values were examined with X^2/df, RMSEA, NFI, CFI, AGFI, GFI, IFI, and TLI. The average variance extracted (AVE) and composite reliability (CR) of the scale were investigated for convergent validity. For divergent validity, the $\sqrt{AVE}$ value was compared with the inter-factor correlation. Cronbach's alpha values, item-total correlation coefficients, and composite reliability (CR) were used to assess the scale's reliability. The analysis was conducted using the SPSS 26.0 and AMOS 24 package tools.

Ethical Procedures

Approval of the Ethics Committee was acquired from Yozgat Bozok University Ethics Committee by Decision No: E-14415064-900-24829 dated 13.07.2021.

Results

Results Regarding the Validity

In scale development studies, a number of researchers suggest that the sample size be "at least 300 people" in order to carry out a factor analysis, whereas some other researchers generally consider that "the number of observations for each variable should be between 5 and 10 people" (Bryman & Cramer, 2001; Comrey & Lee, 1992; Pett, Lackey & Sullivan, 2003; Tabachnick & Fidell, 2007; Tavşancıl, 2005). In this study, data obtained from 517 participants for EFA and that obtained from 302 participants for second-order CFA met the criteria specified for sample size.

The suitability of the data for factor analysis was evaluated prior to the EFA using the KMO and Bartlett's Test of Sphericity. As a result of the analysis, the KMO value was .93 and the result of the Bartlett's Test of Sphericity was significant (X^2=5264, 567, sd= 190, p=0.000). The fact that the KMO value is above .60 and the Bartlett's test gives out a statistically significant result means that the data used in the study are suitable for factor analysis (Field, 2005; Kline, 2010; Pallant, 2001). Principal component analysis, one of the factorization methods, and the Varimax rotation method, one of the rotation methods, were employed to discover the scale's factor construct. The scree plot created on the basis of the EFA is presented in Figure 1.

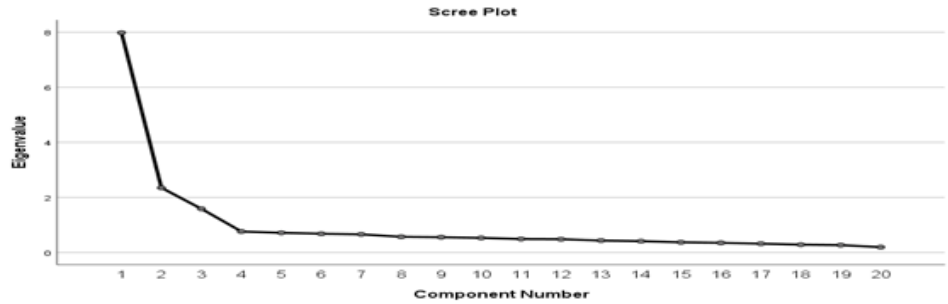


Figure 1. Scree Plot

The 36 items (1, 2, 3, 6, 8, 10, 12, 15, 16, 17, 18, 22, 23, 28, 30, 31, 33, 34, 35, 37, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 53, 54, and 55) loaded on more than one factor were discarded from the 56-item scale after the scree plot and explained variance table were examined at the same time. The remaining 20 items formed a three-factor structure. The eigenvalue of the first factor was found to be 7.98, accounting for 39.91% of the variance. This factor, consisting of 7 items (5, 13, 14, 24, 25, 32, and 36), was named "Inclination". The eigenvalue of the second factor was found to be 2.35, explaining 11.75% of the variance. This factor, consisting of other 7 items (19, 20, 26, 29, 38, 52, and 56), was named "Interest". The eigenvalue of the third factor was found to be 1.58, explaining 7.94% of the variance. This factor, consisting of 6 items (4, 7, 9, 11, 21, and 27), was named "Avoidance". Factor names were determined by taking the opinions of six field experts. These three

sub-factors together explained 60.07% of the variance as regards the related attitude variable. The criterion indicating that the total variance explained should be above 50% is met (Thompson, 2004). Table 2 below presents the factor load values and common factor variance of the items.

Table 2. Factor Load Values and Common Factor Variance

	Items		Inclination	Interest	Avoidance	Common Factor Variance
Inclination	I 5	I think that students are likely to participate actively in the lessons when taught with illustrated children's books.	.652			.480
	I 13	I enjoy having a look at illustrated children's books.	.678			.622
	I 14	Making use of illustrated children's books while teaching increases my motivation.	.727			.687
	I 24	I believe that illustrated children's books attract students' attention.	.795			.699
	I 25	I like to use illustrated children's books in my classroom.	.821			.768
	I 32	I think that my students better understand the subject I am teaching when I use illustrated children's books.	.706			.620
	I 36	I believe that illustrated children's books make teaching fun.	.788			.692
Interest	I 19	I do research on newly released illustrated children's books.		.739		.612
	I 20	I like to follow those who share about illustrated children's books on social media.		.705		.621
	I 26	I follow the publications (magazines, websites, books, etc.) about illustrated children's books.		.733		.631
	I 29	I read book reviews on the Internet to get an idea about illustrated children's books.		.789		.663
	I 38	I go to bookstores, book fairs, etc. to have a look at illustrated children's books.		.731		.566
	I 52	Whenever I go to a bookstore, I never leave the store without stopping by the aisle of illustrated children's books.		.740		.619
	I 56	I enjoy doing research on the authors and illustrators of illustrated children's books.		.746		.587
Avoidance	I 4	I find it tiring to make use of illustrated children's books in my classes.			.708	.529
	I 7	I think that using illustrated children's books is a waste of time in terms of language skills.			.659	.526
	I 9	I feel uneasy as I have difficulty using illustrated children's books.			.696	.485
	I 11	I think that the use of illustrated children's books in lessons is not appropriate in terms of fulfilling the achievements.			.623	.447
	I 21	I find it difficult to plan a lesson to teach with the support of illustrated children's books.			.692	.531
	I 27	I think that illustrated children's books will make it difficult to use time effectively.			.655	.536
		Eigenvalues:	7.97	2.35	1.68	-
		Explained Variance:	39.88	11.76	8.43	-
		Total Variance Explained:		60.07		-

* The table does not display load values smaller than .40.

The factor loads of the first factor related to the scale's items are between .65 and .82, those of the second factor are between .70 and .78, and those of the third factor are between .62 and .70, as shown in Table 2. Having factor loads above .40 provides the criteria for an item to be included within a factor (DeVellis, 2014; Hair, Black, Babin, Anderson & Tatham, 2014; Harrington, 2009). These findings show that the construct validity of the scale is provided.

The correlation coefficients between the scale's factors are shown in Table 3. As a consequence of the analysis, the factors were found to have a moderate, positive, and significant association.

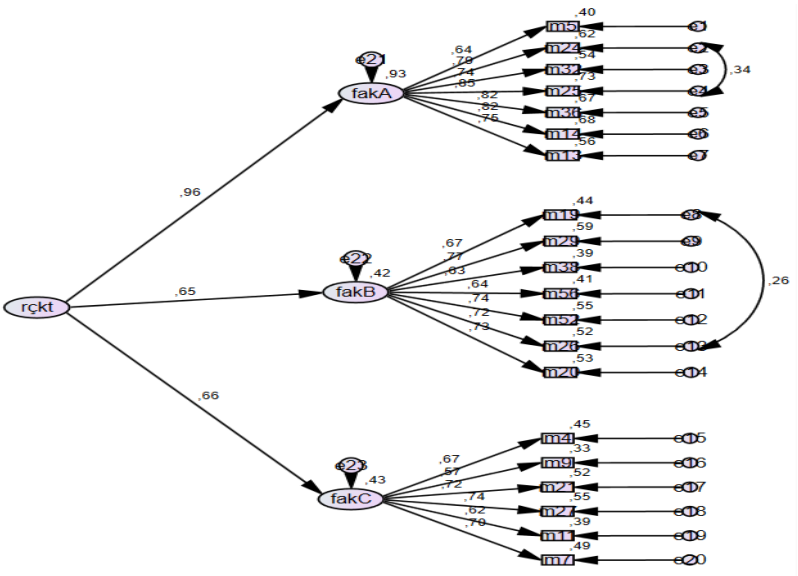
Table 3. Correlation Coefficients between Factors

Factors	1	2	3
1.Inclination	-		
2.Interest	.566*	-	
3.Avoidance	.523*	.347*	-

*p<0.001

The correlation between the factors of the scale is between .37 and .56, as shown in Table 3. The fact that the correlations are above .20 with p<0.001 provides evidence that these three factors constitute the components of the classroom teachers' attitude towards illustrated children's books (Kalaycı, 2010).

Second-order CFA employing the maximum likelihood method was used to confirm the three-factor structure produced by the EFA. Figure 2 shows the factor distributions and values obtained from the second-order CFA.



Şekil 2. Second-order CFA

In this study, X^2/df, RMSEA, NFI, CFI, AGFI, GFI, IFI, and TLI were examined as model fit indices. The findings of of the second-order CFA performed on the scale structure consisting of 3 factors and 20 items, the results obtained with two modifications on the model can be summarized as follows: [χ2/df=1.75 (p=.000), RMSEA=.050, NFI=.91, CFI=.95, AGFI=.89, GFI=.91, IFI=.95, and TLI=.95].

The χ2/df value for the model is 1.75, according to the fit indices derived for it. The model is perfect if the χ2/df value is smaller than 2 (Anderson & Gerbing, 1984; Kline, 2010; Tabachnick & Fidell, 2007). The RMSEA value was found to be .050, indicating a good fit (Browne & Cudeck, 1993; McQuitty, 2004; Steiger, 2007). In this study, the CFI was found .95, while the NFI was .91. When these two values are .90 and above, it can be assumed that the model has a good fit (Kline, 2010; Thompson, 2004). The analysis of the AGFI and GFI values showed that the AGFI was found .89, and GFI was .91. The levels of .85 and above for GFI, and .80 and above for AGFI indicate an acceptable fit (Hooper, Coughlan & Mullen, 2008; Schermelleh-Engel & Moosbrugger, 2003). When it comes to the IFI and TLI values, it appears that the IFI was .95 and the TLI was .95. The values being .95 and above reflects the perfect fit (Byrne, 2011; Marsh, Hau, Artelt, Baumert & Peschar, 2006).

As a consequence of the second-order CFA, the CR value in the AMOS output is distributed as a z-statistic, expressing the statistical significance of the parameter (Byrne, 2011). The CR. values of the items were found to range from 6.18 to 12.58. In order to deem the items to be statistically significant at the .05 level, their Z values are expected to be above 1.96 (Bayram, 2010). According to the CR values of the scale, all items were deemed to be statistically significant in the study. As a result of all the findings examined, the questionnaire developed in this study shows good fit.

Table 4. Convergent Validity Measures

Factors	AVE	CR
Inclination	0.566	0.901
Interest	0.526	0.886
Avoidance	0.472	0.843

Convergent validity was examined through the scale's AVE and CR measures. As can be seen in Table 4, the AVE value is 0.566 for the first factor, 0.526 for the second and 0.472 for the third. The CR value is 0.901 for the first factor, 0.886 for the second factor and 0.843 for the third factor. If the mean variance is below than 0.5 and the composite reliability is above than 0.6, the construct has acceptable convergent validity (Fornell & Larcker, 1981). These findings prove that the convergent validity of the scale has been achieved.

It is possible to compare the $\sqrt{AVE}$ value with the correlation between factors to ensure divergent validity (Hair et al., 2014). In our study, the values we found are as follows: $\sqrt{AVE = 0.75}$ for the first factor, $\sqrt{AVE = 0.72}$ for the second factor, and $\sqrt{AVE = 0.68}$ for the third factor, respectively. As seen in Table 3, the $\sqrt{AVE}$ value of each factor is higher than the correlation between the factors, a result which shows that the scale has convergent validity.

Results Regarding Reliability and Item Analysis

To verify the scale's internal consistency dependability, Cronbach's Alpha reliability coefficients were determined for the entire scale and for each factor independently. In addition, item-total correlation coefficients were examined in order to determine whether each item in the questionnaire measured the approach intended to be measured or not. The results regarding the Cronbach's Alpha reliability coefficients, item-total test correlations and CR values are presented in Table 5.

Table 5. Item-Total Correlation Tests for Items and Cronbach's Alpha Confidence Coefficients

Factors / Items	$\bar{X}$	S	Item-Total Correlation	Cronbach's Alpha Coefficient of Confidence with Item Removed
Factor 1: Inclination (α = .90, CR=.90)				
I 5	4.40	0.73	.595	.908
I 13	4.41	0.64	.705	.895
I 14	4.38	0.66	.765	.888
I 24	4.50	0.66	.743	.890
I 25	4.41	0.63	.808	.884
I 32	4.25	0.70	.709	.894
I 36	4.39	0.64	.746	.890
Factor 2: Interest (α = .89, CR=.88)				
I 19	3.68	0.90	.695	.875
I 20	3.85	0.97	.689	.876
I 26	3.80	0.91	.714	.873
I 29	3.83	0.93	.727	.871
I 38	3.68	0.98	.635	.883
I 52	3.85	0.94	.700	.874
I 56	3.72	0.90	.662	.879
Factor 3: Avoidance (α = .80, CR=.84)				
I 4	4.32	0.75	.564	.765
I 7	4.36	0.76	.583	.760
I 9	4.19	0.83	.483	.784
I 11	4.25	0.79	.523	.774
I 21	4.01	0.77	.579	.761
I 27	4.10	0.78	.589	.759
Scale (α = .91)				

As shown in Table 5, the Cronbach's alpha reliability coefficient obtained for the entire scale is .91, and that for the first factor is .90, with the composite reliability being .90. The Cronbach's

alpha reliability coefficient obtained for the second factor is .89 with the composite reliability being .88, while the Cronbach's alpha reliability coefficient obtained for the third factor is .80 and the composite reliability is .84. That the Cronbach's alpha and CR values are above 0.60-0.70 demonstrates that the scale is reliable (Hair, Hult, Ringle, Sarstedt, 2014; Nunnally, 1978; Şencan, 2005). Such results show that the scale has adequately reliable.

The item analysis results given in Table 3 indicate that the item-total test correlation values vary between .59 and .80 in the Inclination factor, between .66 and .72 in the Interest factor, and between .48 and .58 in the Avoidance factor. Item-total correlation values of .30 and above are validity proof of the scale items' validity (DeVellis, 2014; Kline, 1986; Nunnally & Bernstein, 1994). In the light of these results, it can be assumed that the survey questionnaire items measure the same construct.

Conclusion and Recommendations

In this study, "Attitude Scale for Classroom Teachers towards Illustrated Children's Books" were developed and identified this scale's psychometric properties. In line with the analyses made with the data obtained from two different sample groups in this study, a construct consisting of 20 items and 3 factors (Inclination, Interest, and Avoidance) was formed, and it explained 60.07% of the total variance. There were seven items in the first factor, seven items in the second factor, and six items in the third factor. On the basis of examining the fit index values obtained from the second-order CFA, the scale can be considered to have good fit values [$\chi 2/df=1.75$ (p=.000); RMSEA=.050; NFI=.91; CFI=.95; AGFI=.89; GFI=.91; IFI=.95; TLI=.95]. The scale's AVE and CR values were assessed for convergent validity. The AVE value was .566 for the first factor, .526 for the second factor and .472 for the third factor, whereas the CR value was .901 for the first factor, .886 for the second factor, and .843 for the third factor. As a result, the convergent validity of the scale is ensured. For divergent validity, the $\sqrt{AVE}$ value was compared with the inter-factor correlation. The fact that the $\sqrt{AVE}$ value of each factor (.75; .72; .68) was higher than the correlation between the factors (.56; .52; .34) indicates that the scale's divergent validity was ensured.

Cronbach's Alpha reliability coefficients, item-total test correlations, and CR values were investigated to determine the scale's reliability. The Cronbach's alpha reliability coefficient of the scale was .91 and that of the first factor was .90 with the composite reliability being .90. Likewise, the Cronbach's alpha reliability coefficient obtained for the second factor was .89 with the composite reliability being .88; and the Cronbach's alpha reliability coefficient for the third factor was calculated as .80 and the composite reliability as .84. The results obtained proved that the scale is reliable. In this context, the item-total test correlation coefficients ranged from .59 to .80 in the first factor

(Inclination); from .66 to .72 in the second factor (Interest), and from .48 to .58 in the third factor (Avoidance). These results show that the scale items measure the same construct.

Given the study's findings, it can be assumed that the questionnaire presented in Annex I has a valid and reliable structure. This scale is expected to contribute to the existing literature in terms of exposing classroom teachers' attitudes toward illustrated children's books. The validity, reliability, and factor construct of the scale can be tested with data obtained from various branches of teaching. Further studies can be planned in line with a mixed methods design and can be conducted by enriching the scale with qualitative data. On the basis of the results obtained with the scale developed in our study, educational studies can be planned with teachers towards illustrated children's books. This questionnaire has been developed in Turkish, so it may also be recommended that the validity and reliability of the current scale be examined in terms of different languages.

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Appendix I

Madde No	Maddeler	Kesinlikle Katılmıyorum	Katılmıyorum	Kararsızım	Katılıyorum	Kesinlikle Katılıyorum
1	Resimli çocuk kitaplarıyla işlenen derslerde öğrencilerin derse aktif katılacağını düşünüyorum.					
2	Derslerimde resimli çocuk kitapları kullanmanın yorucu olduğunu düşünüyorum.					
3	Yeni çıkan resimli çocuk kitaplarıyla ilgili araştırma yaparım.					
4	Resimli çocuk kitaplarını incelerken keyif alırım.					
5	Resimli çocuk kitaplarının dil becerileri açısından zaman kaybı olduğunu düşünüyorum.					
6	Ders işlerken resimli çocuk kitapları kullanmak motivasyonumu artırır.					
7	Sosyal medya hesabında resimli çocuk kitaplarıyla ilgili paylaşım yapanları takip etmek hoşuma gider.					
8	Resimli çocuk kitaplarının kullanırken zorlandığım için kendimi huzursuz hissederim.					
9	Resimli çocuk kitaplarının öğrencilerin dikkatini çektiğini düşünüyorum.					
10	Resimli çocuk kitaplarıyla ilgili yayınları (dergi, internet sitesi, kitap vb.) takip ederim.					
11	Derslerde resimli çocuk kitap kullanımının kazanımları gerçekleştirme açısından uygun olmadığını düşünüyorum.					
12	Sınıfımda resimli çocuk kitapları kullanmak hoşuma gider.					
13	Resimli çocuk kitapları ile ilgili fikir edinmek için internetten kitaplarla ilgili yorumları okurum.					
14	Resimli çocuk kitapları destekli işlenecek bir dersi planlamakta zorlanırım.					
15	Resimli çocuk kitaplarının ders işlemeyi eğlenceli hale getirdiğine inanıyorum.					
16	Resimli çocuk kitaplarını incelemek için kitapçılara, kitap fuarlarına vb. giderim.					
17	Resimli çocuk kitaplarının zamanı etkili kullanmayı zorlaştıracağını düşünüyorum.					
18	Bir kitapçıya gitsem resimli çocuk kitabı reyonuna uğramadan çıkmam.					
19	Resimli çocuk kitapları kullandığımda, öğrencilerimin işlediğim konuyu daha iyi anladığını düşünüyorum.					
20	Resimli çocuk kitaplarının yazar ve çizerleri hakkında araştırma yapmak hoşuma gider.					

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An Action Research to Eliminate Mistakes in Multiplication and Division Operations through Realistic Mathematics Education*

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Abstract

In the current study, it is aimed to determine the activities that need to be done to eliminate the mistakes made by primary school fourth grade students in multiplication and division operations and to present solution suggestions for eliminating these mistakes. The study employed action research, one of the qualitative research methods. The study group was constructed by the criterion sampling method, one of the purposive sampling methods. The study group is comprised of 10 fourth graders attending a primary school in the spring term of the 2016-2017 school year in the city of İstanbul and making similar mistakes. A student information form, clinical interview form and student worksheets were used as data collection tools in the study. Activities prepared in line with the principles of Realistic Mathematics Education (RME) were applied in order to eliminate the mistakes made by the students in the multiplication and division operations. When the mistakes made by the students in the multiplication and division operations were examined, it was revealed that the source of the mistakes was the operational, conceptual and problem situations. During the implementation of RME activities, it was determined that the mistakes of the students started to be eliminated. After the implementation, it was found that the mistakes of the students committed in the multiplication and division operations decreased. Thus, it can be said that RME is an effective application in reducing the mistakes in multiplication and division operations made by students in primary school.

Keywords: Multiplication operation, division operation, realistic mathematics education, mistake, primary school

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Introduction

In order to foster scientific and technological developments, investments need to be made on engineering and computer technologies, which are grounded on mathematical knowledge and skills. Mathematics education has an important place starting from primary school in training individuals with advanced mathematical knowledge and skills. For this reason, effective teaching of mathematics in primary school is necessary (Baykul, 1992). In order for this process to be carried out effectively in primary school, it has become necessary to identify the problems that students experience during the development of their mathematical skills and to produce solutions for these problems. The source of the problems experienced during the development of mathematical skills is to have students engage in activities focused on the development of procedural knowledge rather than having them make sense of mathematical knowledge based on daily life experiences in mathematics lessons (Uça & Saracaloğlu, 2017). Since the source of mathematical knowledge is daily life problems, applications made for the development of mathematical knowledge and skills should be intertwined with real life and procedural information should be given based on the concept. In this way, it will be easy for students to make sense of mathematical knowledge and skills, they will create their mathematical operations in a meaningful way in daily life, and it will be easier to eliminate problems related to mathematical knowledge and skills.

Starting from pre-school education, providing mathematics education effectively throughout one's education life has an important place in shaping the future of people. While the development of mathematical knowledge and skills in the mathematics education process will create a productive future, failure to develop them will create a stable future (National Council of Teachers of Mathematics [NCTM], 2000). The effective and efficient conduct of mathematics education will be possible by improving the mathematical knowledge and skills of students with low academic success in the field of mathematics. Students with low mathematics achievement are also expressed as students having difficulties in learning mathematics. The National Joint Committee on Learning Disabilities [NJCLD] (2001) identified mathematics difficulty as a sub-difficulty of learning, and expressed it as students' having problems in perceiving mathematical concepts such as place value and time, keeping mathematical information in mind, and organizing numbers and problems. Mathematical learning difficulty is a comprehensive concept that includes misconceptions and mistakes. Misconception is expressed as the perception or understanding that is far from the view on which the experts agree on a subject (Zembat, 2008). Misconception can also be expressed as information that prevents the teaching and learning of concepts that are proven to be true by science and that are contrary to scientific facts formed as a result of personal experiences (Keçeli, 2007). Misconceptions are systematic mistakes that arise from the comprehension of information that has been proven to be true. Misconception, which is a conception that systematically encourages mistake,

is closely related to mistake. It has been revealed in many studies that students make mistakes as a result of misconceptions (Barmby, Bilsborough, Harries & Higgins, 2009; Cockburn & Littler, 2008; Harris, 2001; Nesher, 1987; Oliver, 1989; Radatz, 1980; Sadi, 2007). While misconceptions are the source of mistakes, not every mistake arises from a misconception (Yenilmez & Yaşa, 2008). Mistake can be expressed as mistakes in responses and misconceptions can be expressed as conceptual barriers that prevent learning (Yılmaz, 2011). In order for an idea put forward by the student to have a misconception, the student must meet three conditions: his/her thought is not in accordance with real science, he/she must present reasons to adopt this wrong idea and he/she is sure of his/her own answers and explanations (Eryılmaz & Sürmeli, 2002). If the student explains that his/her mistakes are correct with the reasons and makes these explanations confidently, it can be said that he/she has a misconception. Identifying and eliminating the misconceptions that are among the reasons for the mistakes made by students and the sources of these mistakes will increase the student's success in mathematics.

In primary school mathematics education, there are basic arithmetic skills that include addition, subtraction, multiplication and division, which are expressed as basic four operations (NCTM, 2000). Learning the four-operation skills without mistakes in primary school has an important place in gaining the mathematical knowledge and skills necessary for success in mathematics. In order for operations and concepts to have mathematical meaning, a relationship must be established between them (Pearson & Somekh, 2003). It is a natural process for students to make mistakes when there is no connection between operations and concepts (Van de Walle, Karp & Bay-Williams, 2014). For this reason, it is important to identify and correct the mistakes made in the four operations so that students do not have problems in the mathematical learning process. Research on primary school students' mistakes in the four operations has focused on identification (Ashlock, 1994; Brown & Burton, 1978; Chick & Baker, 2005; Cotton, 2010; Engelhardt, 1977; Önal & Aydın, 2022; Sadi, 2007; Thompson & Bramald, 2002) while the research on the elimination of mistakes is not sufficient. It is necessary to know the appropriate strategies to eliminate the mistakes because they will negatively affect the next learning of students (Ashlock, 2002; Ben-Hur, 2006; Ojose, 2015).

In the elimination of mistakes in the four operations, it is important to know the strategies suitable for eliminating mistakes and to know the mistakes made in the implementation of these strategies. It is seen that the mistakes made in the four operations at the primary school education level are made more especially in the multiplication and division operations. According to Nures and Bryant (2008), the reason for teaching multiplication and division after addition and subtraction is because these operations seem more complex and difficult. Ayvaz (2010) defined the division operation as the operation that children have the most difficulty in understanding, both semantically and operationally among the four operations. Due to the relationship between multiplication and

division, the source of children's having difficulty and making mistakes in division can be expressed as multiplication. Burns (2007) stated that children should understand the relationship between multiplication and division in order to be more successful in division and not to make mistakes.

In order to perform multiplication and division operations effectively, it is necessary to know addition and subtraction operations. It is important to know the mistakes made in multiplication and division operations for the development and learning of the four operations in children. Harris (2001) classified students' mistakes made in multiplication and division operations. Mistakes made multiplication operations include the confusion experienced by children between the "X" and "+" signs, adding instead of multiplying, writing the carry by directly adding, forgetting the carry, adding the number to the digit by including the carry, multiplying the tens digit with the carry, not being able to create a new digit, mistakes made in multiplying by "0", writing missing digits in multiplication, place value problem, not being aware of the need for cross multiplication, performing adding operations instead of multiplication operations and mistakes made in adding "0" to 10 and the multiples of 10. The mistakes made by children in division operations include confusing "÷" with "X", mistakes in division by "1", dividing small numbers into large numbers, confusing subtraction and multiplication with division, performing subtraction "-" in division by "0", dividing a number by "0" and showing the number as a result, forgetting to move on to the next digit, starting the operation from the right, not from the left, forgetting to add the remainder to the next digit, forgetting the remainder, forgetting to add the value "0" to the division, forgetting to subtract, not adding "0" to the answer, mistakes in multiplication within the division operation and mistakes in subtraction within the division operation. Mistakes in multiplication usually occur in multiplication by "0" and "1" and in shifting digits when multiplying two-digit and two-digit numbers (Bamberger, Oberdorf & Schultz Ferrell 2010; Cockburn & Littler, 2008; Engelhardt, 1977). In the division operation, the mistakes that students usually make are starting the operation from the right, not from the left, mistakes made in the use of the number "0" and in carrying over from one digit to another.

Questions such as how to learn mathematics better, how to increase mathematical knowledge, and how to develop mathematical skills have revealed that knowledge cannot be obtained passively, but that knowledge will be constructed as a result of the learner's own activities. Mathematics teaching should be carried out in a learning environment where students take an active role in the process, learning mathematics is enjoyable for the learner, and a positive attitude towards mathematics is fostered (Uça & Saracaloğlu, 2017). Realistic Mathematics Education (RME), which aims to develop students' formal mathematical knowledge starting from real life situations, is one of the most effective learning theories that increase students' interest in mathematics education and help them learn mathematical concepts and generalizations in a meaningful way (Treffers, 1991). This approach, introduced by the Dutch mathematician Hans Freudenthal, is used in the mathematics

teaching process in many countries. According to Freudental, mathematics is a human activity connected with reality; thus, it should be related to society (Zulkardi, 2000). Mathematics should be associated with reality, be close to children's lives and contain human values. Mathematics should not remain as a human activity; it should be influential and usable in people's lives. Since mathematics will affect people's lives, teaching should take place within a contextual learning and teaching process (Theodora & Hidayat, 2018). In RME, students should learn by developing and applying concepts and tools that are meaningful to them according to the problem situations in life (Bakker, 2004).

RME emphasizes that the subject should be meaningful and natural for students. The formal structure of mathematics reflects the content to the extent that it is real in students' minds (Van den Heuvel-Panhuizen, 2000). In RME, it is not started by using abstract formulas, symbols, rules and definitions; instead, it is aimed to learn in practice by creating concrete situations (Wubbels, Korthagen & Broekman, 1997). In RME, the learning process is organized by establishing an organized deductive structure (Ünal & İpek, 2009). Freudenthal argues that learning mathematics in children will begin with sense-making and that sense-making should be taken as a basis at every stage (Altun, 2006). On the basis of theorem developed by Freudenthal (1968) on mathematics education lays the concept of "mathematization" in which mathematical activities are arranged in accordance with the mathematical understanding and grade levels of the students in relation to the situations they may encounter in daily life. Treffers (1978) divided mathematization into two categories: "horizontal mathematization" and "vertical mathematization". Horizontal mathematization refers to the elicitation of all mathematical tools and the selection of the appropriate ones to be used in the organization and solution of daily problems (Gravemeijer & Doorman, 1999). Vertical mathematization is defined as the process of rearranging the mathematical system. It is also defined as the process of reaching high-level mathematics, which aims to reveal conceptual relationships using symbols (Altun, 2006). Freudenthal (1991) stated that there is no clear line between horizontal and vertical mathematization, that they can take place at every stage of mathematical activities and that the person will decide which one to use and where. In RME, the student's learning of mathematics should occur as doing mathematics. The student should reach the required information himself/herself as a result of the problem solving activity. If there is no real situation for mathematics, an imaginary situation must be created. Thus, in a suitable environment, the child can be engaged in the act of mathematization (Altun, 2012). In the transfer of mathematical subjects, some principles should be taken into account while performing the mathematization process.

The principles of mathematics teaching in RME are different from the ones in the traditional way of teaching mathematics but there is some similarity in content. Since RME, which is an approach to teaching and learning mathematics, has its own characteristics, its principles are different from the ones of the traditional way of teaching mathematics. In the development of the teaching

design for RME, the principles defined by Gravemijer, Cobb, Bowers and Whitenack (2000) and Gravemijer (1994) were updated and the basic principles of directed re-discovery, instructional phenomenon and developing models were determined. The principles of how teaching should take place were established by Treffers (1987). Treffers (1987) stated five principles: factual exploration through contexts, making connection with vertical materials, students' own sense-making and products, interactive teaching and establishing connections between the stages of learning. These principles developed by Treffers (1987) were re-expressed by Van den Hauvel-Panhuizen and Wijers (2005) as six principles: activity, reality, level, establishing connections between activity areas, interaction and guidance, which include the learning and teaching process of students. In line with these principles, the learning and teaching process was planned and implemented.

Mathematics is a system created mentally by humans. This is a sign that mathematics is abstract, so abstract concepts are difficult to acquire (Gür, Hangül & Kara, 2014). Since mathematical concepts are abstract concepts, students learn through concretization (Ernest, 2010). In order to eliminate mistakes that can occur while learning the four operations conceptually in primary school, meaningful real-life-related problem situations should be created (Barnes, 2004; Barnes, 2005) or concrete tools should be included in a visually enriched environment (Flowers, Green & Piel, 2008; Çilingir & Dinç Artut, 2016; Çilingir Altıner & Dinç Artut, 2017). Importance should be attached to studies that prioritize the way they perceive the concepts of multiplication and division and the strategies they use in primary school. While especially student-centred approaches are adopted, it is necessary to understand how children think about these concepts and what kind of mental processes they use in problem situations they encounter (Carpenter, Fennema, Franke, Levi & Empson, 1999). Since better and permanent learning will be accomplished by establishing a connection with real life in the acquisition of operational skills, the mistakes made by the students will be eliminated. It can be said that the activities prepared in line with the principles of RME will be effective in establishing a relationship between the situations that students encounter in daily life and their learning. Realistic Mathematics Education provides students with concrete experiences from the real world and enables them to learn concepts in a meaningful way by increasing interaction in the classroom environment. In this connection, in the current study, it is aimed to determine the activities that should be done to eliminate the mistakes made by primary school fourth grade students in multiplication and division operations and to produce solutions to eliminate these mistakes. The problem statement of the study was determined as evaluating the effectiveness of RME in eliminating the mistakes made by primary school fourth grade students in multiplication and division operations.

Method

Research Model

Since the aim of the study was to find solutions to the problems that might arise in the process and the application processes and the research were carried out together, action research, one of the qualitative research designs, was adopted in the study. Action research was preferred in the study because it does not aim to generalize and is suitable for intervention in the process. Action research should be systematic, not begin with a response, include planning, be based on regular observation, be simple or detailed, be embedded in theory, not be a quantitative research, not present limited findings (Johnson, 2015). In addition, action research is learning by doing and experiencing, which includes defining a problem, making efforts to solve the problem, seeing the success of the efforts, and finding new solutions if the efforts are unsuccessful (O'Brien, 2001). Action research is a research design used to improve the skills of individuals in the field of education. Since the current study was carried out with the aim of improving the operational skills of students by eliminating their mistakes made in multiplication and division operations, action research was employed in the study.

Study Group

In the determination of the study group of the study, first a primary school located in a region with a low socio-economic status in the city of Istanbul was determined. The mistake detection form for operations was administered by the researcher to 175 fourth grade students attending the primary school in the spring term of the 2016-2017 school year. After the application, the study group was determined by using the purposive sampling method. The study group was formed by taking into account the following criteria: the subjects have already been taught in the lessons before the application and the student made mistakes, the students do not have developmental problems, the students do not have any reports by the Guidance Research Centre, the parents and teachers of the students are willing to work, and the students made similar mistakes according to the mistake detection form. The mistakes made by the students in the study group were determined by taking into account the mistakes they made in the error detection form and the answers in the notebook and in-class worksheets. In line with these criteria and expert opinions, 12 students were determined, and since 2 students did not continue in the process, the research was concluded with 10 students, 5 girls and 5 boys.

Data Collection Tools

In the collection of the data, the student information form, the mistake detection form for the four operations, the audio recordings, the student worksheets and the clinical interview form for the four operations were used. The student information form was prepared in order to determine the demographic characteristics of the student. The error detection form for the four operations was used

in the determination of the study group and consists of four parts to determine the errors for addition, subtraction, multiplication and division operations. The audio recording was taken before and after the study to prevent data loss. Student worksheets are prepared for the purpose of checking the action plan and the student and determining the achievement of the action research goal. The worksheets were prepared in line with RME and were used to reveal the development of the student in the process.

The clinical interview form for the four operations consists of 18 questions; 3 for the addition operation, 4 for the subtraction operation, 4 for the multiplication operation and 7 for the division operation. In the mistake detection form, it was determined that the fourth grade students made fewer mistakes in addition and subtraction than in multiplication and division operations. In this connection, more questions about multiplication and division operations were included in the clinical interview form as more mistakes are made in these questions. Therefore, the current study focused on the mistakes made in multiplication and division operations and their elimination. Clinical interview questions were administered to the students before and after the application. The clinical interview was preferred because it could reveal the knowledge structures and thinking processes of the students about the subject, have more flexible questions and allow high interaction. With the applied form, it was aimed to make sense of the mistakes made by the students in the multiplication and division operations. The prepared form was distributed to the students in printed form, the questions in the form were solved by the students, questions were asked to the students when they made mistakes and they were recorded. The students were asked such questions as “How did you solve this question, can you solve it again but loudly this time?”, “How did you continue with the operation?”, “What did you understand from this question?”, “How should this problem be solved?” The students were given the opportunity to think aloud and they were allowed to express themselves loudly. The clinical interviews conducted with 10 students before the application lasted 94 minutes and 7 seconds, and this time was 35 minutes 56 seconds after the application.

Application Process

Since action research includes a dynamic process and has a systematic structure, the data collection process was continuous. Before the application, the personal information of the students in the study group was obtained and clinical interviews were conducted. During the application process, activities developed in line with the RME principles to eliminate mistakes in multiplication and division operations were implemented, and during the implementation of the activities, the students reflected their products on the worksheets. The activities developed in line with RME included not only multiplication and division but also addition and subtraction operations. The reason for this is that most of the mistakes made in multiplication and division are based on the mistakes made in addition and subtraction. After the application, with the clinical interview questions, the students’

state of making mistakes in the multiplication and division operations was revealed. All the clinical interviews before and after the application were recorded.

In order to determine the study group during the research process, 175 students were administered the mistake detection form for four operations between 20 and 22 March 2017 in line with the criteria determined at the primary school fourth grade level. The clinical interview form was administered between 28 and 31 March 2017 before the application and between 23 and 31 May 2017 after the application. The clinical interviews with the students were carried out on the specified dates during the appropriate class hours. The RME activities, on the other hand, were administered to the study group in two class hours on Tuesdays and Thursdays between April 4 and May 18, 2017. The application process took 7 weeks, 4 hours a week, 28 hours in total. In line with the RME principles, 2 activities for addition and subtraction, 4 activities for multiplication and division each were prepared and implemented. The reason why the application was carried out in the spring semester was that they had already finished the topics related to multiplication and division. The activities prepared in line with the principles of RME were conducted in the library of the school with the group formed by bringing together the students who made similar mistakes during the lesson.

Data Analysis

The collected data were analyzed using qualitative data analysis methods in line with the sub-purposes of the study. Each student was analyzed individually in line with the clinical interview questions in order to determine the mistakes made by the students in the multiplication and division operations before and after the RME application. The students' multiplication mistakes were determined according to low (0 and 1 mistake), medium (2 mistakes) and high (3 and 4 mistakes) levels over the four multiplication questions in the clinical interview. In the division operation, low (0, 1 and 2 mistakes), medium (3 and 4 mistakes) and high (5, 6 and 7 mistakes) levels were determined over the seven division questions in the clinical interview. In line with these levels, the developmental status of the students in multiplication and division operations was revealed. The change that occurred in the students during the application process was analyzed individually on the basis of the worksheets. Credibility was tried to be established by providing long-term interaction between the researcher and the students, collecting in-depth data, obtaining confirmation from the participants and taking expert opinion on the research process. As a result of the expert review, the content validity coefficient was found to be .76 for the clinical interview form and .78 for the mistake detection form. Transferability was ensured by describing the findings and the study group in detail.

Results

In this part of the study, the mistakes made by the fourth grade students in the multiplication and division operations were determined, the development of the students regarding these mistakes

during the application process was revealed, and lastly, the mistakes in the multiplication and division operations after the application were revealed.

The mistakes made by the students participating in the study before the RME activities regarding the multiplication operations are shown in Figure 1.

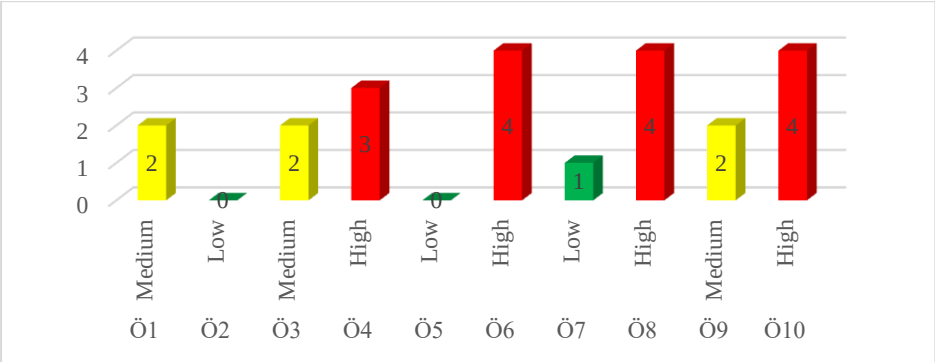

Figure 1. State of the students regarding the mistakes they made in the multiplication operations before the RME application

As can be seen in Figure 1, when the level of mistakes made by the students regarding the multiplication operations before participating in realistic mathematics education was examined, it was found that three students made mistakes at the "low" level, three students made mistakes at the "medium" level and four students made mistakes at the "high" level. Two of the students who were found to be at the "low" level made "0" mistake and the other made "1" mistake. Three of the students who were found to be at the medium level made "2 mistakes". One of the three students who were found to be at the high level made "3" mistakes and the other three students made "4" mistakes. The mistakes made by the students in the multiplication operations were examined individually, and examples of the mistakes made by the student coded S6, who was found to be at the "high" level, and sections from the interview conducted with him/her are given below.

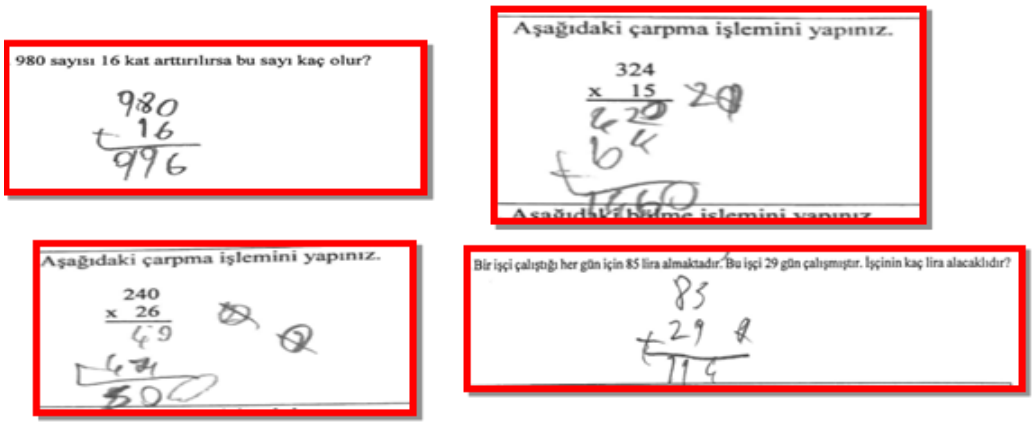

Figure 2. Mistakes made by the student coded as S6 in the multiplication operations before the RME application

The four mistakes made by the student coded as S6 in the multiplication operations are shown in Figure 2. When the first mistake made by the student was examined, it was revealed that the student performed an addition operation instead of a multiplication operation. A mistake was made because he/she thought that the addition operation should be done from the expression "increase" in the question. In addition, a mistake was committed because the word "times" did not connote the multiplication operation. Regarding the solution of the first question in which the student made a mistake, the student said "Addition if it is increased, my teacher." The second and third mistakes made by the student in the multiplication operations are due to the fact that the multiplication of the numbers was performed incorrectly, although the rule of multiplication was known. Regarding the second and third questions in which mistakes were made, the student made the following explanation about his/her solution; "I can't explain, teacher, I don't know how I did it." The fourth mistake made by the student regarding the multiplication operation stems from the fact that he/she was not aware of the necessity of performing a multiplication operation in the case of a problem involving multiplication. While the problem required multiplication, the student performed addition due to his/her prior learning and because it was easy for him/her. Regarding the fourth question in which the student made a mistake, the student said, "Teacher, I didn't understand this part either, so I thought I'd add it."

The mistakes made by the students participating in the study regarding the division operation before the RME activities are given in Figure 3.

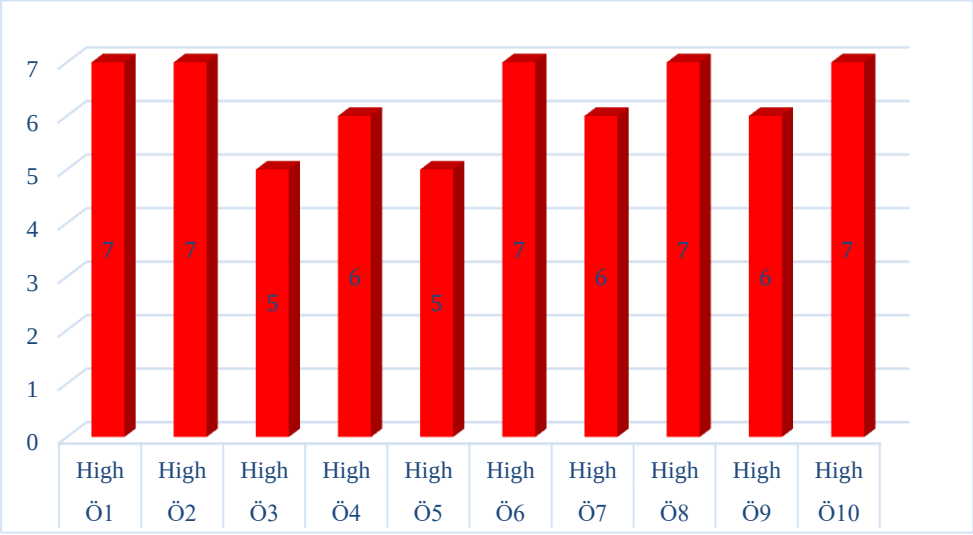

Figure 3. State of the students regarding the mistakes they made in the division operations before the RME application

As can be seen in Figure 3, when the level of mistakes made by students regarding the division operations before participating in realistic mathematics education was examined, it was revealed that ten students who participated in the study made mistakes at the "high" level. Two students at the high level made "5" mistakes, three students made "6" mistakes and five students made "7" mistakes. The mistakes made by the students in the division operations were examined individually, and examples of the mistakes made by the student coded S2, who was found to be at the "high" level, and sections from the interview conducted with him/her are given below.

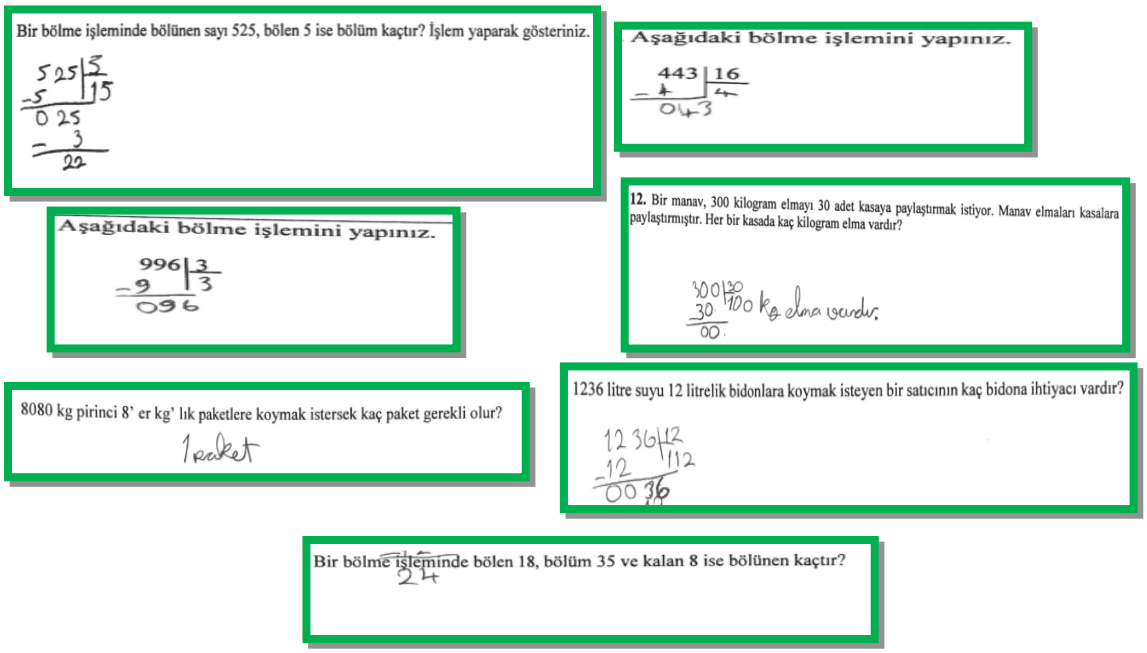

Figure 4. Mistakes made by the student coded as S2 in the division operations before the RME application

In Figure 4, seven mistakes made by the student coded as S2 in the division operations are given. The student made an operational error in adding "0" after starting the process for the first time. Regarding the solution of the first question in which the student made a mistake, the student said, "I guessed that it would be correct when I did division. There is one 5 in 5 but not in 2 thus when we took down 2 we had to remove 0." The second mistake is due to the student searching for 16 inside 4 (the dividend within the divisor). Regarding the second question in which the student made a mistake, the student explained his/her solution as follows; "There are 4, 4 times in 16, I subtracted 4 from 4 and it became 0, I took down 4 and then 3 and I completed the operation." When the third mistake was examined, it was seen that the first step of the division operation was performed, but the next steps could not be performed, so a mistake occurred. Regarding the third question, where the student made a mistake, the student made the following explanation, "There are 3 times 3 in 9, 3 times 3 is 9,

9 is subtracted from 9 and it is 0, I took down 9 and 6, and I completed the operation." In the fourth mistake, the problem situation was transferred to the operation correctly, but the mistake was made as the number "0" was added to the quotient section although it should not have and thus an operational mistake occurred. Regarding the fourth question, where the student made a mistake, the student made the following explanation, "I got stuck a little bit, but I tried to do it. I divided 300 by 30, there is one 30 in 30, I took down 0 from above and added two 0." The fifth mistake made by the student is due to his/her misunderstanding the question. Regarding the fifth question, where the student made a mistake, the student made the following explanation, "I was going to do division, but it found it too difficult." In the sixth mistake made by the student, although the conversion of the problem to the division operation was correct, an operational mistake occurred because the second step of the operation was incorrect. Regarding the sixth question, where the student made a mistake, the student made the following explanation, "I divided 1236 by 12. There is one 12 in 12. I subtracted 12 once out of 36 and got 24. There are 3 12s in 24. The answer is 112." The seventh mistake is due to the student's not answering the question. The student explained why he/she did not answer this question, "I did not understand. I couldn't figure out where the quotient, divisor and remainder would be."

Examples of the answers given by the student coded as S6 on the worksheets to the questions related to the multiplication operation during the application of RME activities are given in Figure 5.

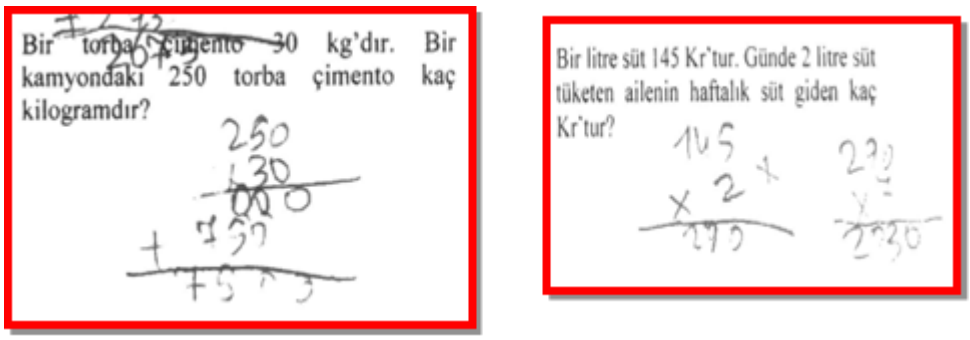

Figure 5. Sample solutions from the worksheets of the student coded as S6 regarding the multiplication operation

Before the research process, the student coded as S6 was making mistakes in the questions involving the concept of "times" in multiplication, making operational mistakes and making mistakes in questions requiring multiplication. The sample questions obtained from the worksheets on the multiplication operation during the application process of the RME activities of the student coded as S6 are given in Figure 5. When the worksheets of the student are examined, it is seen that the mistakes made before the RME have disappeared. It can be said that there is a decrease in the mistakes made by the student in the multiplication operation as a result of the activities prepared in line with RME.

Examples of the answers given by the student coded as S2 on the worksheets to the questions related to the division operation during the application of RME activities are given in Figure 6.

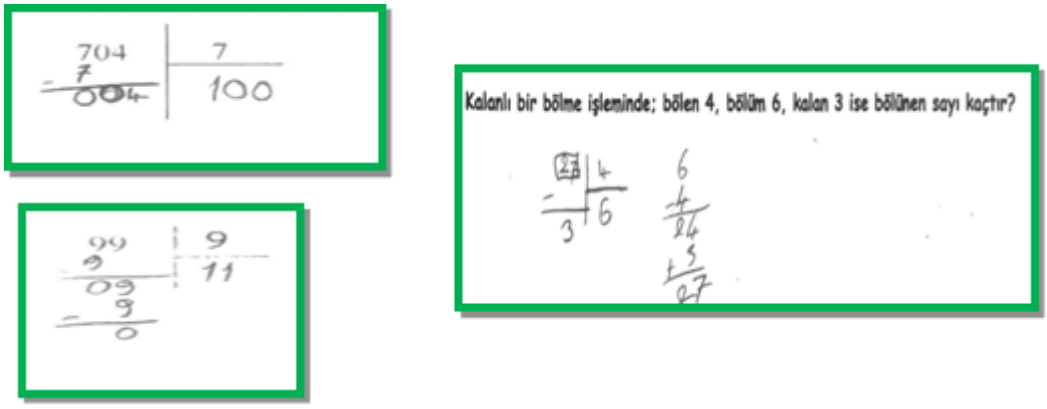

Figure 6. Sample solutions from the worksheets of the student coded as S2 regarding the division operation during the application of RME

Before the research process, the student coded as S2 was making mistakes in the division operation such as adding "0" to the quotient, not being able to continue the division, not knowing the concepts related to division, and problems involving division. The sample questions obtained from the worksheets on the division operation during the application process of the RME activities of the student are given in Figure 6. When the questions in the worksheet are examined, it is seen that the student can add “0” to the quotient in the division operation, continue the division, use the concepts related to division appropriately and perform the appropriate operations. It can be said that there is a decrease in the mistakes made by the student in the division operation as a result of the activities prepared in line with RME.

The mistakes made by the students participating in the study in the multiplication operation after the RME activities are shown in Figure 7.

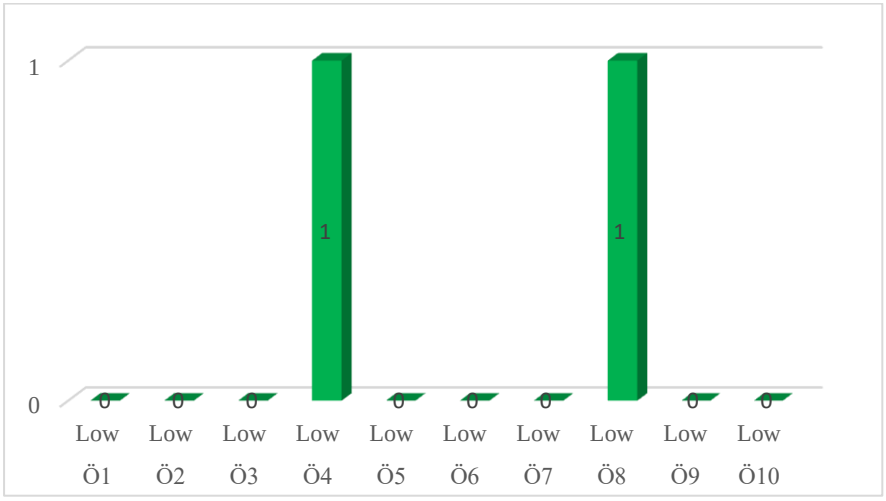

Figure 7. The state of the students in terms of the mistakes they made in the multiplication operations after the application of RME

As can be seen in Figure 7, when the level of the mistakes made by the students in the multiplication operations were examined after the realistic mathematics education, it was found that the ten students who participated in the study made mistakes at the "low" level. While eight low level students made zero mistakes, 2 students made 1 mistake. When the mistake of the student coded as S4 in the mathematic operation was examined, it was seen that he/she made the mistake as he/she perceived the problem situation as requiring addition rather than multiplication and explained his/her understanding as follows; "A worker gets 85 liras a day and then in order to calculate how much he gets in 29 days I add 85 to 29." When the mistake of the student coded as S8 was examined, it was determined that he/she made an operational mistake. On the other hand, it is seen that the student coded as S6 did not make any mistakes in the multiplication operation after the application as could be seen from his/her worksheets.

The mistakes made by the students participating in the study regarding the division operations after the RME activities are given in Figure 8.

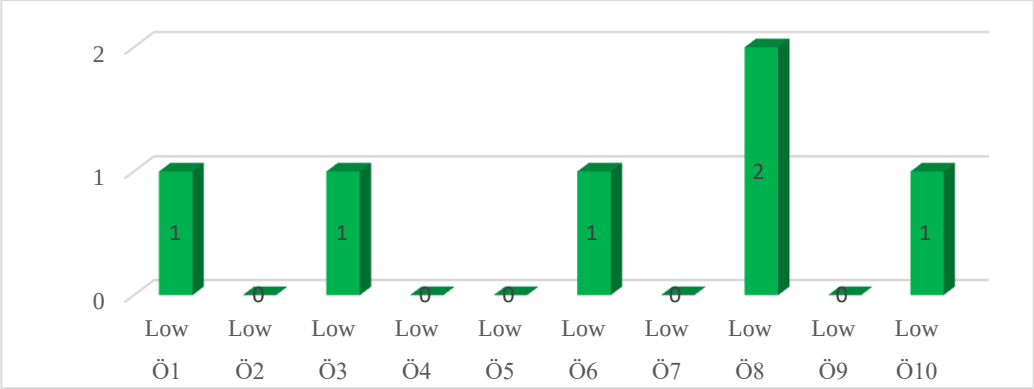

Figure 8. State of the students regarding the mistakes they made in the division operations after the RME application

As can be seen in Figure 8, when the level of the mistakes made by the students regarding the division operations after the realistic mathematics education was examined, it was found that the ten students who participated in the study made mistakes at the "low" level. While 5 students at low level made zero mistakes, 4 students made 1 mistake and 1 student made 2 mistakes. The source of mistake made by the students coded as S1 and S6 who made 1 mistake in the division operation is operational while the source of the mistake made by the students coded as S3 and S10 is due to their not being able to answer the question. The first mistake of the student coded as S8, who made two mistakes, is

due to his/her not knowing the concepts of division, and the second mistake is due to his/her not being able to answer the question.

Table 1 shows the change in the mistakes made by the students to whom RME activities were applied in the multiplication and division operations before and after the application.

Table 1. Distribution of the students' mistakes in the multiplication and division operations before and after RME

Student Code	Multiplication Operation		Division Operation	
	Before application	After application	Before application	After application
S1	2	0	7	1
S2	0	0	7	0
S3	2	0	5	1
S4	3	1	6	0
S5	0	0	5	0
S6	4	0	7	1
S7	1	0	6	0
S8	4	1	7	2
S9	2	0	6	0
S10	4	0	7	1

When Table 1 is examined, it is seen that the majority of the students made mistakes in the multiplication and division operations before the RME activities, and that the mistakes of the students in the multiplication and division operations decreased after the implementation of the activities. It can be said that the RME activities developed for the multiplication and division operations are effective in eliminating or reducing the mistakes that occur in the operations.

Discussion, Conclusion and Recommendations

Before the RME application, it was revealed that two primary school fourth grade students did not make any mistakes in the multiplication operations, one student made one mistake, three students made two mistakes, one student made three mistakes and three students made four mistakes. When the students' level of mistakes in the multiplication operations was examined, it was determined that three students made mistakes at the "low" level, three students made mistakes at the "medium" level and four students made mistakes at the "high" level. Failure to eliminate the mistakes of the students who make mistakes in the multiplication operation will result in unhealthy learning in advanced mathematics subjects. The mistakes made by the students regarding the multiplication operation stem from not knowing the meanings of the concepts related to multiplication, not understanding the problem situation related to multiplication, and operational mistakes. Not knowing the concepts such as "times" involved in multiplication operations causes students to make mistakes in multiplication. Knowing these concepts semantically will reduce the mistakes that students will make in multiplication operations because it has been stated that there is a relationship between the

development of conceptual understanding and the development of operational skills in children (Canobi, 2005; Rasmussen, Ho & Bisanz, 2003). Ünlü and Ertekin (2012) stated that the reason for not being able to establish a relationship between concepts and operational skills is that the teaching process is based on memorization. It is also known that the concepts of multiplication are difficult for students to learn (Tanujaya, Prahmana & Mumu, 2017). This is a situation that prevents conceptual learning for multiplication. It has been revealed that students made mistakes in multiplication operations as a result of not understanding the problems that require multiplication. In order to eliminate this problem of understanding, the problems should be read more carefully, while the process of converting the verbal expression into numerical form should be operated. Since this result indicates the transformation of problems chosen from daily life into mathematical expressions, this problem can be eliminated by implementing the activities created on the basis of RME. This is evidence supporting that the implementation of RME-based activities can be effective in eliminating mistakes. It can be said that another factor leading students to make mistakes in multiplication operations is the inability to transfer them to the problem because they have not acquired conceptual knowledge. In this connection, Baroody (1999) stated that not having gained conceptual understanding causes learning without establishing meanings between concepts and problem situations. The low level of affective status of students towards mathematics enables them to read the problems quickly and solve them without making sense of them. Since this encourages students to have the desire to finish the questions immediately, it causes students to immediately engage in solving problems without paying much attention. As a result of carelessness, mistakes occur in the selection and construction of the operation for multiplication. The operational mistakes that occur in the multiplication operation arise from reasons such as multiplication with “0” and “1”, shifting the digits, forgetting to add the carry, rhythmic counting, and addition operations within multiplication operations. These results are similar to the results reported in the studies by Harris (2001), Barmby et al. (2009) and Anghileri (1989). Elimination of operational mistakes depends on students’ being more attentive, having adequate background knowledge about rhythmic counting, and fully internalizing the conceptual structure of multiplication.

During the implementation of the RME activities for the multiplication operations, the selection of the activities that the students encounter and perform in their close environment, in their lives, increased the students’ interest and participation in the lesson. Since the students realized that they would use multiplication everywhere as a result of their engagement in the activities, they willingly participated in all the work done during the lesson. It is stated that RME is suitable for use in educational environments since it allows students to take active role in lessons (Marsigit, Dhoruri & Mahmudi, 2007; Zaranis, 2016). Since the student takes an active role in the process, it has been determined that the conceptual and operational mistakes related to multiplication have decreased and

disappeared. When the mistakes made by the students in the multiplication operations after the implementation of the RME activities were examined, it was revealed that eight students did not make any mistakes, and two students made one mistake each. When we look at the mistake levels of the students regarding the multiplication operation, it is seen that all the students are at the “low” level. Choosing and applying activities that appeal to students are of great importance in reducing mistakes. RME reduced students’ mistakes regarding the multiplication operations, and fostered a positive point of view in students towards mathematics. The RME activities improved students’ self-confidence towards multiplication. In general, it can be thought that mathematical activities related to multiplication prepared by being influenced by the experiential environment prevent the student from making mistakes about multiplication.

Before the RME application, it was revealed that two primary school fourth grade students made five mistakes, three students made six mistakes, and five students made seven mistakes regarding the division operations. When the levels of the mistakes made by the students in the division operations were examined, it was determined that ten students were at the “high” level. The reason why the students made such a high level of mistakes in the division operations may be that the operational process was unusual, complex and included too many conceptual structures. It has been revealed that the mistakes made by the students regarding the division operations stemmed from reasons such as the concepts of dividend, divisor, quotient and remainder, the use of “0” in division, not being able to continue the operation, and not understanding the problem situation regarding division. Students mostly have difficulty in acquiring the concepts related to the division operation (Simon, 1993). Students may make mistakes as a result of not learning the concepts in the division operation or confusing the semantic values of the concepts. Since there is a relationship between conceptual knowledge and operational skills (Robinson, Ninowsky, & Grey, 2006), the absence of conceptual learning also poses an obstacle to the development of operational skills. This is supported by the statement of Yorulmaz, Uysal, and Sidekli (2021) that conceptual learning is important in order to thoroughly learn the division operation. It can be said that mistakes are made because the concepts of dividend, divisor, quotient and remainder involved in the division operation are abstract and not sufficiently concretized. If the concepts are transformed into concrete objects, the operations related to the concepts will be fully performed as it will be easier to occupy space in the mind of the student. It can be said that the use of concrete objects in the teaching of concepts has an important place in eliminating mistakes and ensuring correct learning. Students make the mistake regarding the use of the number "0" while performing the division operation. Not adding the number “0” to the quotient section is caused by the student’s carelessness or lack of knowledge. Another reason for making the mistake is not knowing the following rule; when dividing, the number is taken down from the top after the subtraction, and if there is no divisor in the newly created dividend number, “0” is added to the quotient. Another mistake made in the division operation is the result of not continuing the

operation as a result of not being able to find the divisor within the dividend by using the multiplication operation or by rhythmic counting. In problems that require division, since the problem is not understood by the student, it cannot be transformed into a mathematical expression. Since the process of transforming the problem situation into a mathematical expression is expressed as mathematization, it can be said that RME is the most effective approach to make this possible. For this reason, the activities used in the application process were prepared on the basis of RME.

During the implementation of the RME activities for the division operation, selection of the activities that the students would encounter and perform in their close environment, in their lives, increased the interest and participation of the students in the lesson and thus they became more ready to learn. The activities which are selected from environments to which students are familiar and in which they can put themselves in place of the characters are important to increase the participation of students with low classroom participation otherwise (Fauzan, Slettenhaar & Plomp, 2002; Barnes, 2005). Students who take an active part in the lesson and participate effectively will be able to better learn the use of the concepts of division and to perform division according to the rules. Students will be able to solve problems more easily if problem situations are created that students will find exciting, entertaining, pleasing and relevant to their needs in their daily lives. When the mistakes made by the students participating in the study after the RME application were examined, it was revealed that five students did not make any mistakes, four students made one mistake, and one student made two mistakes. When the level of the mistakes made by the students in the division operations was examined, it was seen that all the students are at the "low" level. The application of activities that motivate and encourage students to the mathematics lesson has an important place in reducing the mistakes related to the division operation. It can be said that RME-based activities reduce students' mistakes about division and increase students' interest in mathematics. After the RME activities, it is seen that the students are not afraid of performing division operations and it is easier to make sense of it.

When the students' mistakes in the multiplication and division operations before and after the RME application were compared, it was found that there was a decrease in the number of mistakes. The decrease seen in the mistakes made for the multiplication and division operations shows that the RME-based activities are effective in eliminating mistakes. There are many studies that show that RME-based activities are effective on students (Aytekin Uskun, 2020; Barnes, 2005; Eade & Dickinson, 2006; Hansa, 2017; Kalaw, 2012; Marija, Lidija & Simona, 2000; Papadakis, Kalogiannakis & Zaranis, 2017; Peters, 2016, Topçu, 2021, Webb, Van Der Kooji & Geist, 2011; Yorulmaz, 2018). It has been revealed that problem situations created by establishing connections with daily life in line with RME are effective in eliminating mistakes. Makonye (2014) stated that the contextual problems in RME provide a better understanding of mathematical concepts. Again,

Arsoetar and Sugiman (2019) stated that problems that are related to daily life are effective in the construction of mathematical knowledge. It can be stated that RME applications are an approach that should be preferred in eliminating the operational, conceptual and problem-related mistakes made by students. It can be said that eliminating the mistakes made by students in multiplication and division operations will increase the academic achievement in mathematics. In light of the results of the study, the following suggestions can be made.

- When multiplication and division operations are concretized using real-life problem situations, mistakes committed by students can be reduced or eliminated.
- Activities prepared in the context of GME for multiplication and division can be designed using digital content.
- Teachers can work individually with students on the concepts of multiplication and division in order to eliminate mistakes.
- RME can be used as an approach in the education processes of students who have learning difficulties in mathematics.
- RME can be used to correct the mistakes made by students in other subjects of mathematics.

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Thinking about the Chemical Substances through Real-life Incidents: A Case Study on Pre-service Teachers' Knowledge on Various Dimensions of Laboratory Safety

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Abstract

Pre-service teachers who conduct experiments are faced with various risks in terms of physical, health and environment due to the chemicals they are exposed to in the laboratory classes. Working in a laboratory without knowing these risks causes accidents such as chemical spills, explosions and fires, and even individual injuries. For this reason, pre-service teachers should be trained about the importance of safety and the properties of the chemicals with using various learning strategies. In this context, we aimed to determine the knowledge about lab safety among the pre-service teachers through real-life laboratory accidents. This study, which focuses especially on the role of chemical substances in laboratory safety, was discussed with its various dimensions. 21 pre-service teachers taking the Laboratory Safety course and attending the Chemistry Teaching Program in a state university's the Faculty of Education in Aegean region (Turkey), participated in this research, based on the case study method. Worksheets containing cases related to laboratory accidents and semi-structured interview form were used as data collection tools. Considering the results of the research, we found that the pre-service teachers generally had a lack of knowledge on the chemicals' hazard classifications, physical, health and environmental hazards, pictograms, chemical properties, and safety precautions of chemicals within the frame of laboratory safety.

Keywords: Laboratory Safety, Chemical Substance, Hazard Classification, Accident, Pre-service Teacher

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Introduction

Regarding natural phenomena, experimental studies are undoubtedly critical in obtaining scientific information in situations where observations cannot be made directly. Chemistry, a branch of natural science, is one of the fundamental fields in which experimental studies are conducted together with applied working methods, principles and inventions. The environment in which chemistry finds a field of application is laboratories (Lunetta et al., 2007). Laboratory environments in which various activities carried out have been a valuable part of a chemistry curriculum since they provide students with authentic and concrete experiences, which, when structured properly, improve their learning (Hofstein et al., 2013). The students acquire a variety of skills and establish a link between practice and theory with laboratory activities in which they interact with materials to observe and understand the natural world (Akkuzu & Uyulgan, 2017; Hofstein & Lunetta, 2003; Kang & Wallace, 2004). The fact that students perform the experimental activities carried out in the laboratory environment step-by-step helps them to understand and learn the chemistry lesson. In this whole process, laboratory applications make learning more meaningful and permanent by improving students' hand skills, research and problem solving, and scientific process skills. In this process, in which knowledge and skills are acquired by students through experiments, students need the knowledge of many laboratory equipment such as glassware, lab machines and chemicals and the ability to use them in the laboratory (Uyulgan & Akkuzu, 2019). Because all kinds of studies on education and research performed in the laboratory bring along various risks. For example, chemicals used during experiments may carry flammable, explosive, toxic, oxidizing, corrosive and irritating hazardous properties. All these properties carry various risks in terms of physical, health and environment (Adane & Abeje, 2012; Ryder, 2014). Trump and Moore (2001) stated that the potential threat posed by hazardous chemicals is just as serious as school violence. In addition to this, tools, equipment, and instruments used during experiments in the laboratory pose risks, including glassware, burners, gas bottles, and instruments with high pressure and temperature (Wu et al., 2021). Due to these reasons, taking necessary precautions is one of the prerequisites to provide safe working environments for the students exposed to hazardous substances and used laboratory equipment. If laboratory safety is not given priority, unplanned and unexpected laboratory incidents, namely real-life accidents, are unavoidable which result in life threats that cannot be recycled such as hurts, physical injuries, poisonings or deaths (Hill & Finster, 2016). Real-life accidents include accidents experienced by individuals in the laboratory environment and are the accidents that are the subject of newspapers and news.

When real-life accidents in the laboratory environment are examined, it is observed that among the most common accidents are fire, explosion, spills of chemicals, chemical and thermal burns, cuts from broken pipes and thermometers, absorption of toxic (but non-corrosive) chemicals

through the skin, electric shock and inhalation of toxic fumes (Aydogdu, 2015; Aydogdu &Yardımcı, 2013; Feszterová et al., 2007, as cited in Feszterová, 2015, p.893; Grabowski, 2017; Rohr Daniel, 2011). Similarly, Hill and Finster (2016) emphasized that chemical spills, electrical hazards, runaway reactions are the most common incidents in laboratories. Li (2014) analyzed 100 accidents in the period from 2001 to 2013 and he found that the fire, explosion and poisoning were the main laboratory accidents. The toxic effects of vapors formed because of spilling chemical substances such as mercury, nitric acid, sulfuric acid and phenol (American Industrial Hygiene Association [AIHA], 2015, as cited in Hill & Finster, 2016), fire, and explosion events that occur by exposing the tubes containing organic solvents and liquids such as flammable alcohol to fire (Shariff & Norazahar, 2012), toxicity or fire and explosions because of gas leaks from a cylinder (Zhang et al., 2020), fires and explosions caused by contact of active metals with water or flammable organic solvents are examples from the literature regarding the accidents (Hill & Finster, 2016). The most common of these accidents are those that can occur simultaneously during the experiment. For example, before starting the distillation experiment, it should be ensured that the system is vented. Otherwise, an explosion may occur at the beginning of the experiment due to heating. As a result of such an explosion, hot glass shards and corrosive chemicals may be splattered. Besides, other real-life accidents such as ingestion of toxic chemicals also occur as a result of accidentally ingesting harmful chemicals by pipette, from dirty hands, from contaminated food or drink, by using chemicals taken from the laboratory.

Real-life accidents in the laboratory are often the result of carelessness and/or ignorance (Wu et al., 2021). In a laboratory environment, students are sometimes in a hurry and they can trip over something while carrying chemicals, or spill while transferring chemicals, besides that they can make the wrong choice in selecting safe practices or do not use safe handling practices. Considering these situations, we can say that incidents are often intrinsically linked to individuals' at-risk behavior while working in the laboratory and this is due to either a lack of knowledge about the danger of the behavior or knowing about the danger but ignoring it. Many studies have shown that the root cause of the incidents in a laboratory environment is due to a lack of safety management, poor judgment on the teachers' part, lack of safety knowledge and training, lack of proper facilities and safety equipment, inadequate laboratory space and intentional, irresponsible, reckless, or dangerous individual acts (Fuller et al., 2001; Hill & Finster, 2016; Hoff, 2003; Richards-Babb et al., 2010; Schenk et al., 2018; West et al., 2003). When all these reasons are examined, it can be said that the kinds of incidents are generally caused by human errors. The main reasons are that teachers and students do not have enough information about the properties of chemical substances and the use of tools and equipment, or they have incorrect knowledge, they are careless during the experiments, and they do not know how to behave in the face of possible dangers (Abu-Siniyeh & Al-Shehri, 2021; Hill, 2016). Therefore, to minimize the occurrence of incidents in lab environments, it is an indispensable

requirement that all individuals working in the chemistry lab should be trained about the importance of safety and the properties of the chemicals with proper instructions and it is extremely important providing safe working environments (National Research Council [NRC], 2011; Walters et al., 2017). In this context, it is essential to train pre-service teachers who constitute the sample group of the present study, who will frequently encounter the laboratory environment in their professional life and who will be responsible for informing their students about laboratory safety.

Pre-service teachers need to create a positive safety environment in order to reduce or eliminate the accidents that may occur in the laboratory environment in the schools where they will work and to provide their students with laboratory safety awareness so that they can acquire an effective safety culture (Wu et al., 2007; Yılmaz, 2005). This primarily depends on the pre-service teachers' experiences in this subject. Studies indicate that while planning the training courses to be given in the laboratories, it is necessary to recognize the chemical symbols, evaluate the damage possibilities, perform risk planning to minimize the harms, and adopt holistic approaches to be prepared for emergencies (Banda & Sichilongo, 2006; Stuart & McEwen, 2016). For example, Scheck et al. (2018) investigated the call records of the Swedish Poisons Information Centre (PIC) about severe injuries and accidents in the laboratory environments. In the results of their research, they determined that 70% of the reports were composed of students exposed to laboratory chemicals (especially in accidents caused by acids and alkali). To avoid similar situations, they reported that teachers and their students who work in the laboratory need to have knowledge of chemicals risks and safety measures. Also, in another study by Ziara et al. (2021), a case study was conducted with undergraduate analytical chemistry students about their chemical safety awareness. Their results were similar in this respect that the students should get some sort of chemical safety training or asked to complete a chemical safety course prior to their graduation. Feszterová (2015) stated that laboratory safety was critical in chemistry laboratories, especially in the academic preparation courses of the pre-service chemistry teachers and also emphasized that such preparation would be a precaution against occupational injuries and risks that could threaten health and cause injury. In their studies with university students, Wu et al. (2021) found that they had deficiencies in laboratory safety issues such as Globally Harmonized System (GHS) pictograms, common hazardous chemicals, and basic laboratory safety practices and emergency. They also stated that safety education should be integrated into university courses in order to make safety a priority in the laboratory. Many studies similar to these findings highlight the need for more effective and careful laboratory safety training (Fivizzani, 2016; Hill, 2021; Ménard &Trant, 2020; Meyer, 2017; Sigmann, 2018; Yang et al., 2019). Studies on laboratory safety suggest that various educational methods should be used to bridge theory and practice (Akpullukçu & Çavaş, 2017; Gallego et al., 2013; Hill & Finster, 2016).

Akpullukçu and Çavaş (2017) stated that the use of scientific methods will produce effective solutions so that individuals can work safely in the laboratory and take precautions against problems. The use of various methods and strategies that allow mental reasoning and questioning rather than transferring information is essential for pre-service teachers to grasp the subject "laboratory safety". In this context, it is necessary to use different strategies such as case studies, problem-based learning and context-based learning, in order for the pre-service teachers to know about laboratory safety. From this point of view, we preferred to conduct the research based on real-life incidents in the laboratory by referring to international news. One of the points determining our preferences is that pre-service teachers may encounter similar incidents in the laboratory courses they will take in other semesters and also in their future teaching lives in the laboratory environment. Another is to confront pre-service teachers with real-life scenarios or problems with cases (Svinicki & McKeachie, 2012), to enable them to analyze the incident and to discover their knowledge about the hazard classification of the chemicals; their physical and chemical properties; their physical, health and environmental hazards; their pictograms (hazard symbols); their safety precautions; their storage conditions and first aid practices that could be taken for the accident. Cases reinforce the practical content on laboratory safety (Carr & Carr, 2016). Therefore, with this study, it is crucial to provide pre-service teachers with a preliminary experience and readiness about the laboratory safety. Using international news about accidents to case studies we aimed to obtain rich layers of information and understanding about the knowledge of laboratory safety from the pre-service teachers' perspective. This knowledge, while not claiming generality in a positivistic sense, does offer pre-service teachers a chance to discern what kind of knowledge they should have in terms of safety, how they can follow the laboratory accidents they may face, what kind of solutions they can apply to their own context and what they cannot. Considering that the information about safety made before the experiments in the laboratory environment is deficient and limited, it is extremely crucial to raise awareness on these issues with various learning strategies. When the related studies on pre-service teachers are examined, it is observed that they are mostly aimed at investigating the knowledge levels and attitudes of them about laboratory safety (Anılan, 2010; Artdej, 2012; Can et al., 2015; Kırbaşlar et al., 2010). In this study, we thought that the use of the cases would pave the way for obtaining more detailed data and making deeper interpretations, since we aimed to reveal the change in the knowledge of pre-service teachers about laboratory safety over time, based on the incidents encountered in the laboratories. In recent years, the importance of lab safety education and deficiencies of students about lab safety stand out in the results of the literature on the subject, which constitutes the framework of this study. For this reason, this study is significant in order for pre-service teachers who will train in the laboratory to gain experience in lab safety and to identify their deficiencies. Based on all the above-mentioned issues, in this study, it is aimed for pre-service teachers to learn more permanently about laboratory safety, and cases are used for this. In this regard, within the scope of laboratory safety, cases related to

the accidents that occurred in the laboratory environment were presented to the pre-service teachers, and the cases were discussed with various dimensions. We try to answer the following questions in the study:

- To what extent do the knowledge of pre-service teachers in various dimensions within the scope of laboratory safety change through the cases?
- What is the knowledge of pre-service teachers regarding various dimensions within the scope of laboratory safety according to the categories of accuracy?
- What are the views of pre-service teachers on laboratory safety implemented with cases?

Method

Research Design

The research design used for this study was the case study that investigates contemporary phenomenon within its real-life context when the boundaries between the phenomenon and context are not clearly evident or not sufficiently theorized; and in which multiple sources of evidence are used (Merriam, 2013). Gerring (2007) and Hancock and Algozzine (2006) define case studies as deeply grounded studies that describe phenomena or cases in detail that occur in their natural conditions over a period of time using various data collection tools. Since this study sought to determine the role of cases in increasing the freshman pre-service teachers' knowledge related to the laboratory safety subjects, single case-holistic design was used. Single case-holistic design that reveals a situation is based on the systemic approach of a phenomenon (Yin, 2014). In this context, the current research invokes qualitative methods that use various data collecting tools and numerous perspectives to obtain some kind of explanation of the change of the students' knowledge about the laboratory safety subjects over time.

Participants

The sample group of the study was selected according to the typical case sampling method, which is one of the purposive sampling methods. According to this method, a typical situation is determined among the many situations in the study universe related to the research problem and data is collected from this sample (Creswell, 2013; Marshall & Rossman, 2014). In this context, pre-service teachers studying in the Chemistry Teaching Program of a state university in the Aegean region (Turkey), taking the Laboratory Safety course in Fall Semester of 2018-2019 were selected as the study group. In this study, in which knowledge levels of pre-service teachers on laboratory safety during the process was examined, with this method, the knowledge and expertise of them could be benefited from and rich information could be obtained from pre-service teachers. The study group consisted of 21 freshman pre-service teachers, and 19 of the participants were female and 2 were male pre-service teachers. In their experience with the laboratory, pre-service teachers only took part in the

experimental environment in secondary education through observing demonstration experiments and did not receive any training on laboratory safety. This situation showed that pre-service teachers did not have knowledge of this subject, and that they were a homogeneous group.

Data Collection Tools

In this study, worksheets containing cases related to laboratory accidents and semi-structured interview form were used as data collection tools.

Worksheets with Cases

Worksheets presented to pre-service teachers during the research process include 4 cases obtained from the international news. Cases enable pre-service teachers to face the real-life experiences. Also, cases assist to fill the gap between theory and practice in the teaching environment and help pre-service teachers develop solutions to a problem in the face of a problem (Ching, 2014). Thus, pre-service teachers actively participate in the learning process by improving their knowledge and skills. In addition, this study, which is handled within the framework of cases, provides an opportunity for pre-service teachers to produce solutions to the problems they may encounter in their laboratory practices in the future. In this context, worksheets presented to pre-service teachers include four different cases. The sources of cases were selected from ready-made cases and included international news on the World Wide Web. The international news was translated into Turkish by the researchers, and then they were finalized by checking the translation and making corrections by two faculty members who are experts in the discipline of English Language Teacher Education. Various criteria were taken into account when selecting the real-life cases by the researchers. The first criterion was about the accident that the pre-service teachers might encounter in the future as well as the structure that interested them. Another criterion was that various chemicals that could cause accidents were included in different classifications of hazardous substances. In this regard, it was considered that pre-service teachers should have knowledge about these classifications, which include the chemical substances they will encounter in the laboratory environment. For example, in 1st case, the lab explosion that occurred at the University of Hawaii on September 23, 2016 was caused by a mixture of oxygen gas (an oxidizing and compressed gas), hydrogen gas (a flammable gas) and carbon dioxide gas. The accident described might be experienced by the pre-service teachers in the future and they might be exposed to the types of hazardous chemicals in the laboratory. Table 1 shows the cases implemented in the laboratory safety course every week and the cause of the accident, the chemicals responsible for the accident, a description of the accident, and hazard classification of the chemicals in these cases.

Worksheets included 11 open-ended questions related to the cases that would enable pre-service teachers to reflect on their thoughts on different aspects of laboratory safety. The questions

were asked in alphabetical order as A, B, C... K (see Table 2). Cases and questions were analyzed by researchers, who administered the course of laboratory safety, and necessary revisions were done.

Table 1. Cases implemented in the laboratory safety course every week

Week	Case	Title of the news	Source and date	Description of the accident	Chemicals responsible for the accident	Hazard classification of the chemicals
1	1	University of Hawaii fined $115,500 for lab explosion	https://cen.acs.org/articles/94/web/2016/09/University-Hawaii-fined-115500-lab.html (September 23, 2016)	While preparing a gas mixture of 55% hydrogen, 38% oxygen, and 7% carbon dioxide when an electrostatic discharge likely ignited the mixture, an explosion occurs.	A gas mixture of hydrogen, oxygen, and carbon dioxide	Compressed gas (for all gases) Oxidizing (for Oxygen gas) Flammable (for Hydrogen gas)
2	2	Two high school kids burned in lab accident	https://nypost.com/2014/01/02/students-injured-in-high-school-science-class-blast/(January 2, 2014)	During the flame experiments that a chemistry teacher conducted with four kinds of nitrate salts, a volatile methyl alcohol fumes accumulated in another laboratory and when the buildup of methyl alcohol fumes reached the chemistry laboratory where the flame test was carried out, fumes ignited into a fireball that sped across a countertop and engulfed a sophomore student.	Methyl alcohol	Flammable Toxic Health hazard
3	3	Princeton University laboratory accident sends three people to the hospital	https://www.nj.com/mercer/index.ssf/2012/05/princeton_university_laborator.html (May 23, 2012)	It is the chemical irritation of both the female student and the people around her as a result of the severe steam created by a post-doctoral female student accidentally adding solvent waste to nitric acid while doing an experiment.	Nitric acid	Corrosive Oxidizing Harmful/irritant
4	4	Severe case of poisoning due to phosgene inhalation during chemical accident	https://mobil.bfr.bund.de/cm/364/cases_of_poisoning_reported_by_physicians_2008.pdf (p.28) (March 14, 2008)	A test tube used by a professor working in a university laboratory during the production of phosgene from triphosgene is separated from the apparatus. And during this production, phosgene escapes and causes poisoning.	Phosgene	Toxic Corrosive Compressed gas

Table 2. Questions for cases in worksheets

Questions	
A	What is the cause of the accident in case?
B	Which chemical substance(s) cause the accident?
C	What are the physical and chemical properties of the substances?
D	In which type of hazard classification are the chemical substance(s) included in the CLP (classification, labeling and packaging regulation of substances and mixtures) regulation?
E	What are the health hazards of the chemicals?
F	What are the physical hazards of the chemicals?
G	What are the environmental hazards of the chemicals?
H	Explain by drawing the pictograms specified in the CLP regulation of the chemicals in terms of hazards.
I	What security measures were neglected in the incident? What kind of precautions need to be taken?
J	What are the rules for the storage of the chemicals in this case?
K	What kind of first aid can be rendered to the injured person as a result of the incident?

In each worksheet, the questions directed to the pre-service teachers about cases of various accidents included the cause of the accident, hazard classification of the chemicals causing the accident, their physical and chemical properties; their physical, health and environmental hazards; their pictograms (hazard symbols); their safety precautions; their storage conditions and first aid practices that could be taken for the accident. Table 2 contains the questions asked to pre-service teachers in the worksheets. As an example, a worksheet including case is presented in the Appendix.

Within the framework of cases and questions, the main purpose is to enable pre-service teachers to think about what they need to know when working with chemicals in the laboratory environment and to prepare them for safety and precautions for laboratory courses that they will take in the next terms by allowing them to question in this process.

Semi-structured Interview Form

In order to determine the contribution of the pre-service teachers to the learning process of the course taught with cases and their views on laboratory safety, 10-minute semi-structured interviews were conducted with them. Participation was voluntary, and not all the pre-service teachers wanted to be included in the interviews. Therefore, the interviews were implemented with volunteers among them (n=11). The researchers prepared an interview form consisting of four open-ended questions. The questions are presented in the results section of the research. The interviews were conducted individually and in a comfortable environment free of distractions. Before the interview, pre-service teachers were informed about how the interview would be conducted, the data obtained would only be used within the scope of scientific research, their identities would be kept confidential, and their consent was obtained to participate in the interview. The data from the semi-structured interview were recorded on audio tape, then transcribed and finally analyzed by the researchers.

Procedure

The study was carried out in the Laboratory Safety course, which covers two lesson hours (45 min each) per week in the curriculum. The main purpose of this course is to train pre-service teachers on the safety rules and regulations in the laboratory, the physical and chemical properties hazardous chemicals, effects of the hazardous chemicals on the human and environment and handling the hazardous chemicals. At the beginning of the study process, within the scope of the course contents, presentations containing general information about the accidents that may be encountered in the laboratory and their causes, hazard classifications of chemicals and mixtures, pictograms, safety precautions, storage conditions and first aid issues were made by the researchers for approximately 5 weeks and 10 lesson hours in the Laboratory Safety course to pre-service teachers. The purpose of these presentations is to ensure that pre-service teachers are at a certain level of knowledge, have an idea about the questions asked when they encounter cases, and create a framework about relevant topics. Before the case-based implementation process began, the researchers gave a brief explanation to pre-service teachers about how the 4-week process would progress. Then, worksheets were distributed to pre-service teachers and the implementation process was begun by explaining how they should fill in the worksheets. The participants, who filled out the worksheets, expressed their opinions on the cases and the precautions that could be taken in the class discussion, also by using their written statements. The total duration of the study, including interviews, was 10 weeks.

Analysis of the Data

In the analysis of the data from the worksheets, the categories of Correct (C), Partially Correct (PC), Incorrect (IC) and No Answer (N/A) were taken as basis for each question, and the distribution of the answers of the pre-service teachers according to the categories was calculated. In order to assess the total scores to be obtained from the data, the correct category was evaluated as 2 points, the partially correct category as 1 point, and the incorrect and no answer categories as 0 points. The maximum score obtained from 11 questions in each case was 22, and the total score of 21 pre-service teachers was 462. The scores of all pre-service teachers from each case were calculated as the total score, and their scores were presented descriptively on the graph in terms of percentage. In addition to the data obtained quantitatively, in line with these categories, the level of knowledge of pre-service teachers in which questions in the process and their deficiencies in which subjects were also revealed in detail as qualitative data. The content analysis method was used in the analysis of the interview data, which was conducted to examine the change in the knowledge of pre-service teachers about laboratory safety in more detail after the application and to get their views on the application. After the semi-structured interviews were transferred to the word, categories were created, and these categories were given together with frequency value and sample statements. Content analysis was performed separately by the researchers, and the percentage of agreement was calculated 98% by

using Miles and Huberman's formula (Reliability= [Agreement/Agreement + Disagreement] x 100) in terms of the reliability of the data (Miles & Huberman, 1994, p. 64).

Findings

Findings of Worksheets with Cases

The distribution of the responses given by the pre-service teachers to the questions in cases by categories is shown in Table 3.

Table 3. Distribution of responses to the questions in cases by categories

Q	Category	Case 1	Case 2	Case 3	Case 4	Q	Category	Case 1	Case 2	Case 3	Case 4
A	C	20	0	4	15	B	C	7	0	3	21
	PC	0	9	14	6		PC	13	0	15	0
	IC	0	10	0	0		IC	0	19	0	0
	N/A	1	2	3	0		N/A	1	2	3	0
C	C	7	9	9	0	D	C	2	8	0	3
	PC	13	10	9	14		PC	11	11	0	18
	IC	0	0	0	7		IC	7	0	18	0
	N/A	1	2	3	0		N/A	1	2	3	0
E	C	2	3	10	7	F	C	5	9	2	0
	PC	18	16	8	14		PC	15	4	16	15
	IC	0	0	0	0		IC	0	6	0	0
	N/A	1	2	3	0		N/A	1	2	3	6
G	C	8	5	7	10	H	C	2	3	0	0
	PC	12	14	11	8		PC	7	13	8	13
	IC	0	0	0	0		IC	11	3	10	8
	N/A	1	2	3	3		N/A	1	2	3	0
I	C	0	3	11	0	J	C	0	2	8	0
	PC	20	16	7	21		PC	20	14	10	21
	IC	0	0	0	0		IC	0	3	0	0
	N/A	1	2	3	0		N/A	1	2	3	0
K	C	0	2	11	11						
	PC	15	12	7	5	Total Scores of Cases		250	207	235	270
	IC	5	5	0	5						
	N/A	1	2	3	0						

Considering the categorical distribution of the responses, we found that correct answers were mostly obtained in questions A and B, and partially correct responses in questions C, D, E, F, G, H, I, J and K. In addition, although correct and partially correct responses were in the majority, incorrect responses were also found in questions A, B, C, D, F, H, J and K.

In question A, pre-service teachers were asked to determine the cause of the accident in case. When we examined the answers to this question, we observed that although the pre-service teachers mostly provided correct answers, a certain proportion of pre-service teachers had incorrect answers. For example, in the 2nd case, some pre-service teachers thought that the *fire occurred as a result of burning (reacting) methyl alcohol with nitrate salt*. In addition, in the partially correct answers given to the 3rd case, pre-service teachers were able to state that *an accident occurred as a result of adding*

solvent to nitric acid, and we can infer that they could partially distinguish between the incompatible chemicals when mixed. However, what stands out in the findings is that the pre-service teachers could not make statements about how the added solvent caused sparks and splashes.

As we considered the responses to the B question, which identified the chemicals that caused the accident in case, it was determined that although the pre-service teachers answered mostly correctly, they also gave partially correct and incorrect responses. For example, in the 2nd case, some pre-service teachers did not think that the flames in conducting the flame test could ignite methyl alcohol, instead the pre-service teachers stated that *nitrate salts and methyl alcohol reacted and caused a fire*. In the partially correct answers in the 3rd case, the pre-service teachers could not figure out the specific solvent (water or acetone) that caused the accident upon addition of nitric acid, but they could only express that *it was an incompatible solvent*. Here we infer that pre-service teachers do not have knowledge about which chemicals can react to cause accidents because of their interaction with each other and give an undesired chemical reaction when mixed.

In question C, pre-service teachers were asked to indicate the chemical and physical properties of the chemical substances that caused the accident. The responses of the pre-service teachers to this question were mostly partially correct. For instance, they were generally able to express *the physical properties of chemical substances such as color, odor, taste, solubility, melting point and boiling point,* but they could not specify the chemical properties of the substances in terms of flammability and chemical stability. Similarly, in the 4th case, pre-service teachers were able to name the physical properties of phosgene ($COCl_2$), which is generally *a colorless gas and smells reminiscent of freshly cut grass at low concentrations*; but they could not express their reactions. Additionally, some pre-service teachers had misconception that *phosgene has flammable properties*.

The pre-service teachers were asked about the hazard classifications of the chemicals in the incident according to the CLP (Classification, Labelling & Packaging) regulation. We observed that the responses to the D question were mostly partially correct, and some also incorrect. For example, in the incorrect responses determined in the 1st case, some pre-service teachers stated that o*xygen gas (O_2) is classified as easily flammable and explosive.* Unfortunately, they did not state that oxygen is classified as oxidizing (burning) substances, whereas oxygen (O_2), hydrogen (H_2) and carbon dioxide (CO_2) are classified as gases under pressure. In the 3rd case, some pre-service teachers misclassified *nitric acid as flammable and explosive*. Likewise, they were unable to state that nitric acid is a corrosive substance based on the cause and consequences of the accidents. We also found that some pre-service teachers confused the oxidizing property of nitric acid with the classification of explosive. Since nitric acid is not self-igniting, its classification as an explosive substance is incorrect. However, nitric acid, a strong oxidizing agent, reacts violently with many metal and organic substances. In the partially correct responses in the 4th case, some pre-service teachers classified *phosgene as a toxic and*

mutagenic substance but did not specify its corrosive property. In short, we can conclude that pre-service teachers do not have sufficient knowledge about the classification of the hazardous chemical.

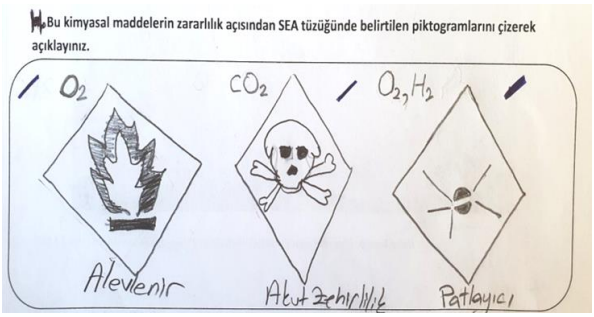
Another question (E) on the effect of hazardous chemicals on the health was directed to pre-service teachers. The majority responses were both correct and partially correct answers. Incorrect answers were not found. In the partially correct answers, the pre-service teachers stated only the *harmfulness of carbon dioxide* based on the 1st case, but it was not specified what kind of hazard it could cause when there were excess oxygen and hydrogen gases in the environment. They didn't consider that these chemicals could be harmful to health. In the 2nd case, although some pre-service teachers stated that *the toxic property of methyl alcohol is only in case of ingestion,* they did not consider that this property may also occur in case of inhalation or skin contact. In the 4th case, it was observed that a certain proportion of pre-service teachers expressed that *phosgene is toxic in terms of health hazards, in case of skin contact and inhalation.* This indicates that the pre-service teachers were partially aware of the effect of hazardous chemicals on health, and they were unable to explain the consequences of the hazardous chemicals. This was because they were unable to mention the severe skin burns and eye damage, shortness of breath, severe pain in the chest as well as edema by being broken down into hydrochloric acid in the lungs upon inhaling and skin contact with phosgene.

Findings related to another question (F) were the explanations of pre-service teachers about the physical hazards of chemicals involved in cases. In these statements, it was seen that partially correct answers were in the majority. However, on the other hand, we also found that incorrect statements were made regarding the 2nd case. To give an example of incorrect statements, a few pre-service teachers expressed that *methyl alcohol (CH_3OH) was corrosive in terms of physical hazards,* and they confused it with its toxic property, which is one of the health-related hazards. Theoretically, methyl alcohol has toxic properties, not corrosive, when in contact with the skin. Also, its flammable nature was not emphasized. This shows that pre-service teachers do not know the physical hazards of methyl alcohol. In the 3rd case, several pre-service teachers could express that nitric acid corrodes metals. On the other hand, a great majority of pre-service teachers stated in the partially correct answers that *nitric acid (HNO_3) may cause an explosion in a fire due to its strong oxidizing property.* In this sense, the findings indicate that pre-service teachers' knowledge about the physical hazards of chemicals is not sufficient.

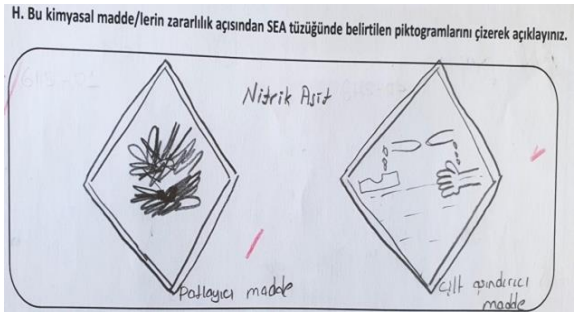
Question G was about the effect of hazardous chemicals on the environment. Pre-service teachers' responses to this question mostly contained partially correct statements by mentioning that *the inhaling phosgene may damage plants and animals* based on the 4th case. On the contrary, a few pre-service teachers stated that *phosgene was used only in chemical warfare,* and they did not know its harm to the environment. In the 3rd case, the pre-service teachers were able to state in their correct

responses that *nitric acid was toxic in the aquatic environment in terms of environmental hazards, and it caused industrial pollution and acid rain*.

In question H, pre-service teachers were asked to draw the chemical hazard pictograms specified in the CLP regulation. The responses to this question turned out to be inaccurate and insufficient. For example, in the 1st case, flammable and explosive pictograms were drawn for oxygen gas. Similarly, they drew an explosive pictogram for hydrogen gas instead of a flammable pictogram. Additionally, we met the same problem for carbon dioxide gas as they drew a toxic pictogram to represent it. This is because the pre-service teachers confused with carbon monoxide gas (see Figure 1). Also, pre-service teachers were unable to draw the compressed gas pictogram for the O_2, CO_2 and H_2 gases. This finding indicated that they could not comprehend the compressed gas pictogram. In the 2nd case, the majority of pre-service teachers were able to draw flammable and toxic pictograms for methyl alcohol. However, they did not draw the health hazard pictogram for methyl alcohol, which included the harmfulness of causing damage to the organs. When the drawings in the 3rd case were examined, although the pre-service teachers could draw the corrosive pictogram for nitric acid, they also drew explosive and flammable pictograms and showed nitric acid in misclassifications. In the 4th case, we determined that a few pre-service teachers drew the flammable and environmental hazard pictograms for phosgene, but they did not draw the toxic and corrosive pictograms. Examples of pictogram drawings of pre-service teachers are given in Figure 1.



(Example of 1st case, PT-9)



(Example of 3rd case, PT-20)

Figure 1. Examples of pre-service teachers' drawings of pictograms

In question I, pre-service teachers were asked on the negligence and the precautions steps taken to ensure laboratory safety. The majority of the pre-service teachers provided correct and partially correct responses. None of them provided an incorrect response. Generally, the pre-service teachers expressed the precautions steps taken without explaining the negligence. For example, in the 1st case, there were statements about *the use of appropriate Personal Protective Equipment (PPE), and the safe storage of cylinders.* For example, there were no statements about keeping oxygen and hydrogen gas away from heat, sparks, flames, and all flammable materials. Pre-service teachers could not evaluate the chemicals separately, which coincides with their statements that all of these gases

cause the explosion. Similarly, it was revealed that the pre-service teachers did not express the necessity of using gas masks as a neglected safety measure in the 4th case. Only few pre-service teachers stated that *the gas mask was not used as a neglected safety measure in the incident and the ventilation was not done well.* However, these pre-service teachers did not make statements about the use of PPE, such as gloves and safety goggles; ignoring the fact that phosgene comes into contact with the skin in any way.

Another question (J) directed to pre-service teachers was about the rules for storing the chemicals to ensure laboratory safety. We found that partially correct responses were in the majority. For example, in the 1st case, pre-service teachers generally used expressions such as *ventilation, keeping explosive chemicals away from ignition sources*. The pre-service teachers could not provide information about the storage of chemicals at ambient temperature and the proper methods to dispose and transport tubes containing a mixture of gases. Pre-service teachers stated that in the 2nd case, *chemicals must be stored out of direct sunlight, and their storage areas must be well-ventilated, non-smoking, dry, and cool environment.* However, there were no statements on storing incompatible chemicals separately to avoid a hazardous reaction based on the hazard classifications. This fact reveals that pre-service teachers were unable to classify the materials to be stored according to appropriate hazard warnings and their group of compatible/incompatible chemicals. In the 3rd case, they stated that *the environment should be ventilated for nitric acid, stored in a cool place away from the sun, kept away from flammable, not in contact with water and stored in its original containers.* However, their statements also revealed that pre-service teachers had misunderstood that nitric acid should be stored on the top shelf of a storage unit.

In the last question (K) regarding the cases, the knowledge of pre-service teachers about the types of first aid that should be applied in case of injury during the accident was assessed. It was determined that the partially correct answers constituted the majority, but there were also a few incorrect answers. For example, in the 1st case, they did not know much about the first intervention to be done to the injured person in the event of a limb (arm) amputation. Pre-service teachers stated that *severed limbs should be kept on ice and the emergency services should be reported.* In addition to this, they had incorrect information that *tourniquet intervention should be done in cases where tourniquets should not be applied.* Based on the second case study, it was determined that there was a lack of knowledge on the intervention of 2nd and 3rd degree burns. For instance, a few of the pre-service teachers gave correct answers, stating that *ointment should not be applied,* while most of them incorrectly stated that *ointment should be applied to the burnt area* and *it should be treated with medication*. These findings indicated that pre-service teachers did not consider that the burned area should be cooled and wrapped with a sterile dressing in first aid intervention. In the partially correct answers in the 3rd case, pre-service teachers suggested that *the irritated area should be washed with*

plenty of water during the first aid process for nitric acid irritation, and should be taken the injured person outside in case of inhalation. Pre-service teachers made incorrect statements in the 4th case, such as that *people exposed to phosgene gas should be made to vomit and drink water and milk.* Although the pre-service teachers knew that phosgene was toxic, they did not have any idea about the first aid to be given for the lethal dose of phosgene.

The percentage of scores per case by the 21 participants is summarized in Figure 2. Considering the total scores obtained from four different cases applied throughout the research process, there was an increasing change in the knowledge levels of pre-service teachers in the 2nd, 3rd and 4th cases after the 1st case. The reason for the high score in the 1st case and the decrease in the next case is due to the fact that the pre-service teachers explained the cause of the accident and chemical that caused the accident inaccurately. In the 2nd case, the fact that the substance causing the fire (methyl alcohol vapors) was not known by the pre-service teachers, and incorrect answers were frequently encountered related to its physical and health hazards and pictogram drawings, which decreased in the total score. In addition to this, in the 1st incident, the chemicals may have been more familiar to the pre-service teachers.

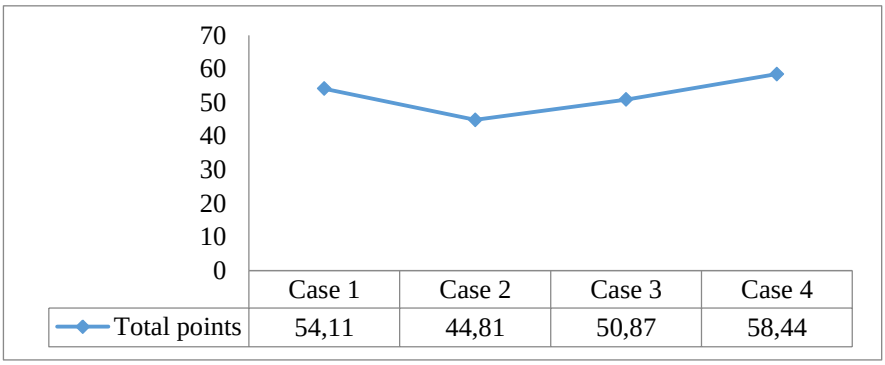


Figure 2. The percentage of scores per case

When evaluating the scores obtained from the case worksheets over 100 points, it was observed that a minimum success rate of 44.81 (Actual total score=207) and a maximum of 58.44 (Actual total score=270) were achieved (see Figure 2). The fact that the total scores are in the range of 45-60 points indicates that the knowledge of the pre-service teachers about laboratory safety is at a moderate level. Considering the results in general, it was revealed that pre-service teachers had a lack of knowledge and also incorrect knowledge, especially on the pictogram drawings of chemicals, hazard statements, rules for the storage of the chemicals, and the first aid intervention.

Findings of the Interview

After the application, the first question asked to pre-service teachers was as follows: *What kind of contributions did the 4-week laboratory safety course based on cases have made for you?* Most of the pre-service teachers (f:9) stated that they acquired more awareness about the classification

of chemical substances and they comprehended it better through the cases. Additionally, some pre-service teachers (f:5) realized that they may encounter laboratory accidents in daily life as well, and stated that their contribution in this sense is crucial. A few pre-service teachers (f:4) stated that they were able to analyze hazards of chemical substances in more detail in terms of physical, health and environment via cases. Table 4 contains categories and example statements that emerged from the data of pre-service teachers.

Table 4. Findings regarding the contributions of cases

Categories	f	Sample Statements
Awareness of classifications of chemical substances	9	I learned that many chemicals in the cases are included in various hazard classifications such as flammable and explosive. (PT-3) I realized that the explosion occurred because of the oxidizing property of the oxygen gas, not flammable. I realized that I confused both properties. (PT-9)
Awareness of lab accidents encountered in daily life	5	An accident can happen at any time while performing an experiment in the laboratory. Therefore, it is very crucial to know the properties of chemical substances and how to ensure lab safety. Because the lab is actually where we face reality. (PT-5)
Learning about chemicals' hazards in terms of different types	4	When it comes to the hazards of chemical substances, the first thing that came to my mind was what the most common hazard was. I have not examined the physical, health and environmental hazards of each chemical substance separately. (PT-2)

In order to determine the difficulties that the pre-service teachers had in comprehending the knowledge about the chemicals in the case, the question *Which part of the worksheets related to the cases did you find most difficult to answer?* was asked. A significant part of the pre-service teachers (f:8) stated that they could not write the chemical properties of the substances that caused the accident. This state points out that pre-service teachers do not have sufficient knowledge about the reactions of chemical substances. Another issue that most pre-service teachers (f:10) had difficulty with was that they confused the pictograms of chemical substances and could not draw them. Also, a certain proportion of pre-service teachers (f:5) stated that they could not have an idea about what kind of damage the chemicals stated in the incident had. These findings are presented in Table 5 together with the example sentences of pre-service teachers.

Table 5. Findings regarding the difficulties in cases

Categories	f	Sample statements
Pictograms (hazard symbols) of chemicals	10	It was difficult for me to draw pictograms of the substances. For example, while I was drawing the pictogram of the oxygen gas, it was incorrect that I draw the pictogram of the flammable substance. I realized I had confused it with the oxidizing pictogram. (PT-9)
Chemical properties of substances	8	I could not remember the reactions of most chemicals. I could write down a few physical properties of many chemical substances such as color and solubility, but I could not write how they reacted with which substances. (PT-8)
Hazards of chemical substances	5	I was unaware of the numerous chemical substances' physical and health hazards. For example, although I knew that methyl alcohol was toxic, it had never occurred to me that it was physically flammable. (PT-1)

Considering the accidents in cases, the question *What could be the accidents that you may encounter within the scope of the laboratory application courses you will take in the next semesters?* was asked to the pre-service teachers. Table 6 summarizes the thoughts of pre-service teachers about what accidents they may encounter and which they are more concerned about in the laboratory environment. Accordingly, all of the pre-service teachers (f:11) stated acid and base burns, while a significant part of them (f:7) expressed explosions with physical hazards.

Table 6. Findings regarding the accidents that the pre-service teachers may encounter within the scope of laboratory practices

Categories	f	Sample statements
Acid and base burns	11	I am concerned that acid would irritate my skin. For example, when I draw up acid into pipette, I am terrified spilling it on me. I may not know what to do in a situation like this. (PT-10) If I am doing an experiment using acids and bases, their vapors may get into and burn my eyes. It can even make me blind in the long term. Therefore, I definitely need to use safety goggles. (PT-7)
Explosion	7	Although the instructor is in the laboratory environment, my carelessness or ignorance during the experiment can cause an explosion. (PT-4)

Finally, pre-service teachers were asked the following question: *What should you pay attention to in terms of safety in order not to encounter any accidents in the subsequent laboratory practice courses?*. The findings showed that pre-service teachers mostly focused on the categories of having knowledge of chemicals (f:8), using personal protective equipment (f:11) and using tools and equipment (f:4) (see Table 7).

Table 7. Findings regarding the safety precautions

Categories	f	Sample statements
Personal protective equipment	11	As part of laboratory safety, first, I pay attention to wearing aprons, safety glasses, gloves and having my hair tied. (PT-4) In order to avoid any risk of burns, I take care to have full protective clothing before starting the experiment. (PT-7)
Knowledge of chemicals	8	Before performing an experiment in the laboratory, I research the properties of the chemicals I will use and what effects they have on humans and the environment, and I want to do the experiment only after that. (PT-6)
Use of tools	4	I want to know which laboratory glassware to use in experiments and how. Just like I know that a beaker is different from the erlenmeyer flask because it is heat resistant. I think this is very important to prevent possible accidents. (PT-3)

Discussion and Conclusion

In chemistry laboratories, it is an extremely important precaution that pre-service chemistry teachers have knowledge about laboratory safety, so that they are prepared for occupational injuries they may encounter and risks that may threaten their health. In this regard, real-life examples of laboratory accidents were presented to the pre-service teachers and their knowledge of laboratory safety with its various dimensions was examined in depth by conducting inquiries over these cases.

The results of the study indicate that pre-service teachers generally had insufficient knowledge about the chemical properties of substances, hazard classification and hazard symbols of chemicals, the storage of some chemicals and the incompatible chemicals and first aid. Pre-service teachers associated the damage of chemical substances with the cause of the accident and accordingly misclassified the chemical substances. In addition, they do not know exactly the physical, health and environmental hazards of chemical substances and they may confuse these hazards. One of the prominent results of the study was to raise awareness of pre-service teachers about exemplary real-life accidents that they may encounter while working in a laboratory environment. Based on this result, they also stated that they could notice the deficiencies they experienced in laboratory safety and that the study process conducted with cases contributed to them in this respect. In a similar research, Turner and Shamsid-Deen (2005) developed a lab safety module and implemented Problem-Based Learning (PBL) and Investigative Case-Based Learning (ICBL) to facilitate the retention and synthesis of concepts and terms through real-life scenarios and open-ended situations. Barrier (2005), on the other hand, used activities that allow students time to reflect on lab safety rules and implemented the rules through cooperative learning. As in this study, it was necessary to introduce the subject of laboratory safety from a very broad perspective by presenting real-life cases with active learning methods to pre-service teachers who will be trained in the field of science. In this context, it was concluded that pre-service teachers should be supported with practices to increase their awareness on this subject.

Considering the results of the research, we found that the pre-service teachers had insufficient and inaccurate knowledge on some subjects of laboratory safety in general as well as the correct knowledge. In cases where laboratory use techniques and safety precautions are not considered, laboratory accidents are inevitable, and these accidents can cause irreversible life-threatening hazards (Aydogdu, 2015; Coşkun, 2017; Gong, 2019). Wu et al. (2007) stated that as a result of the safety measures that teachers will take in the laboratory environment, their students will also be affected by this and display cautious behaviors. For this reason, it is essential for pre-service teachers, especially those trained in the field of science, to have sufficient knowledge on safety. In this research, it was determined that the pre-service teachers thought that the chemical substances that caused the accidents during the case were reacting with each other. This also indicated that the pre-service teachers had a lack of knowledge about the properties of the chemicals involved in the accident. Similarly, the same problem was encountered in the question of chemical and physical properties. Pre-service teachers could give answers mostly about the physical properties of substances, but they could not adequately express the chemical properties of substances, such as their reactions, flammability, and chemical stability. The studies emphasized that if students do not know the properties of chemicals, they cannot adequately assess the risks and minimize them with proper

preparation, which may cause some minor accidents and even serious injuries, including loss of life (Hill, 2016; Wu et al., 2021).

Another result of the current study was about the knowledge of the pre-service teachers about the hazard classification of chemicals, and it was noteworthy that they had both inaccurate and deficient knowledge on this subject. Pre-service teachers wrote the hazard statements by considering the results of the accidents such as explosion, poisoning. For example, if there was an explosion in case, they responded by thinking that all chemicals involved in the reaction could be explosive. From another perspective, when poisoning occurred in the case, they could only express the toxic property of the chemical, but could not specify its other hazard statements. The lack of knowledge of pre-service teachers about these classifications may cause several problems: they may be unable to evaluate the hazards they encounter while working in the laboratory environment correctly, consequently they may not be able to take the necessary protection measures to avoid possible accidents. For this reason, the most important step that should be acquired by pre-service teachers regarding laboratory safety is the knowledge of the hazardous properties of chemicals (Wu et al., 2021). Laboratory safety training is a course given in the first-year to pre-service chemistry teachers in university education. This training should be supported by other laboratory practices during the laboratory courses. Otherwise, it may be possible for individuals not to recognize chemicals they will encounter in different laboratories or to ignore safety precautions (Hill, 2016).

When we examined the results of the research on what the pre-service teachers comprehended about the physical, health and environmental hazards of chemical substances, it was found that besides the correct answers, they also misclassified many chemical substances. In addition, while the pre-service teachers only stated the hazards of substances such as carbon dioxide, methyl alcohol in terms of health, they could not express other hazards. This is similarly seen in the pictogram drawings of the chemical substances of the pre-service teachers. Although pre-service teachers could show in which hazard classification the relevant chemical was included, they also drew incorrect pictograms that did not belong to the chemical. Additionally, it was determined that the pre-service teachers could not draw the correct pictogram of some chemical substances and they had these shortcomings in their hazard statements. This may be due to pre-service teachers working in the laboratory not paying attention to the symbols of chemical substances and ignoring the warnings and signs on their labels. Parallel to this result, many studies reported that university students were unfamiliar with hazard warning signs for laboratory chemicals and unable to know pictograms of them (Adane & Abeje, 2012; Karapantsios et al., 2008; Lunar et al., 2014; Walters et al., 2017). In addition, as in the results of the current study, pre-service teachers associated the damage of chemical substances with the cause of the accident and therefore added incorrect statements to their correct ones. We encountered this problem, especially in the statements and drawings of the pre-service teachers. Due to the cause of the

accident, they showed a corrosive substance such as nitric acid in the flammable and explosive class, and an oxidizing substance such as oxygen gas in the explosive classification. The fact that the pre-service teachers do not have sufficient knowledge in the hazard classification of chemical substances exposes them to possible risks. The studies show that university students, who know these classifications correctly, will both make them aware of the risks and behave more consciously in the protective measures to be taken against these dangers (Vaz et al., 2010; Walters et al., 2017; Ziara et al., 2021). Determining whether the substances to be used while working in the laboratory environment are toxic, explosive, or easily flammable, checking that the pressurized cylinders are always attached to the wall or a solid support, determining the location of the safety information, and reading the safety cards of the chemicals to be used are among the safety precautions to be taken before the study (Walters et al., 2017). In the current study, pre-service teachers mostly focus on using personal protection equipment, using tools and equipment, and having knowledge of chemicals in terms of precautions that can be taken. Walters et al. (2017) and Hill and Finster (2016) emphasized that the security awareness, including security precautions, should be maintained in conjunction with practices and stated that it is important to establish this connection in academic education.

Another result was that pre-service teachers could not give adequate answers about the neglected safety measures that caused the accidents in the cases. Pre-service teachers were able to express more measures to be taken in their responses. In some cases, they ignored a security measure that was very crucial to the case. The reason for this may be the fact that they did not conduct experiments in a laboratory environment before, and therefore they did not receive training on precautions in the laboratory. In addition to this, studies show that responsible instructors work without taking adequate precautions and/or not paying enough attention to security precautions. Al-Zyoud et al. (2019) reported that supervisors had weaknesses regarding how staff deal with specific emergency incidents, such as the proper use of fire extinguishers during an accident so their students do not have adequate knowledge in these situations. The safety precautions that students will learn in the laboratory environment and their ability to protect themselves from the dangers they will encounter affect their whole life (Coşkun, 2017; Gong, 2019). It should not be forgotten that the most important issue to be considered while working in the laboratory in all experimental applications is "safety" (Yılmaz, 2005). Security measures are taken to ensure that all studies are conducted safely, not to limit practical work. Here, the first thing to be considered is that the instructor working in the laboratory has good safety knowledge (Akpullukçu & Çavaş, 2017). Well-trained instructor can guide them in informing the pre-service teachers, ensuring that they follow the rules, eliminating the deficiencies and taking the necessary precautions. In this way, pre-service teachers who acquire these qualifications in their university education can set a good example for their students in laboratory studies in the future.

Another important factor that may cause an accident in laboratory safety is safe storage of the chemicals. Even if pre-service teachers have sufficient knowledge of safety precautions, incorrect storage of chemicals can also cause an accident. In the study, we found that the pre-service teachers had insufficient knowledge about the storage of the incompatible chemicals and incorrect knowledge about the storage of some chemicals. In a similar study, Artdej (2012) stated that the 4th grade pre-service teachers of the Faculty of Education in Thailand have insufficient knowledge about the proper handling, storage and disposal of chemicals and that awareness of this issue should be increased. Similarly, in his research, Gudyanga (2020) determined that the physical science teachers were unaware of the storage and disposal of chemicals and of emergency responses in the chemical laboratory. This same issue has been encountered in various studies (Lacy, 2006; Schenk et al., 2018; Trump & Moore, 2001). This shows that possible accidents can only be avoided if chemicals are handled properly and stored in accordance with strict safety regulations.

In addition to all these safety rules that are expected to be followed in the laboratory, it is also crucial that the first aid to be applied in the event of a possible accident is done quickly and in accordance with the method. The results obtained from the research on this issue indicated that the pre-service teachers did not have sufficient knowledge in terms of first aid in the case of an accident. Pre-service teachers, who think that they may encounter dangers such as acid-base burns and explosion, especially in laboratory applications, have insufficient and incorrect knowledge about the first aid that can be given in cases such as burns and limb amputation that may be seen in these accidents. For example, some pre-service teachers have inaccurate knowledge about how the first aid will be applied to the burned area, such as applying ointment and treating it with medication. This shows that they did not think that the burn area should be cooled and wrapped with a sterile cloth. Therefore, it was observed that there were incorrect interventions in their statements, the result of which could be quite dangerous. If the pre-service teachers have basic concepts of first aid, they can deal with injury in a more confident way in case of any possible accident and it is easy to improve the awareness in this issue in a very limited time (Akıllı, 2018; Altınkaya Kurtulmuş, 2019; Huston et al., 2018).

To sum up, the results of this study indicated that chemistry pre-service teachers could partially increase their knowledge levels on laboratory safety covered with cases; however, this knowledge was not at a sufficient level. Unlike the existing literature, this study dealt with laboratory safety issues in various dimensions and tried to shed light on the current situation of pre-service teachers on these issues.

The results show that pre-service teachers should be educated about laboratory safety, should acquire an understanding of laboratory safety in a broad perspective, and this should be permanent by establishing a relationship with their real lives. Future studies on this subject should be conducted that

can lead students to change their behavior by assimilating laboratory safety knowledge. In addition, in order to improve the awareness of pre-service teachers on this subject, some suggestions were made considering the results of the study and the relevant literature.

Recommendations

- Our study is limited by a small sample size; in addition, it has the limit of only including one class in university. Hence, our results cannot be seen as representative of the whole of the population. Therefore, similar studies can be repeated over different samples. In addition, these case studies on laboratory safety can be conducted at different grade levels taking laboratory courses, and the level of knowledge on this subject can be investigated according to the grade level.
- Studies can be carried out within the scope of experimental activities in order for pre-service teachers to have a more concrete and in-depth knowledge about the properties of chemicals, their hazards, precautions to be taken during use, rules for storage, and necessary first aid in case of possible accidents. Within the frame of experimental activities, laboratory safety issues can be handled from a wide perspective with active learning methods such as case studies, problem-based learning and cooperative learning, and thus, the knowledge of pre-service teachers on this subject can be increased.
- A wide variety of sample scenarios can be presented to the pre-service teachers about the accidents that may occur in the use, storage and disposal of chemical substances in the laboratory, and these issues can be studied in depth by questioning over the events that have occurred.

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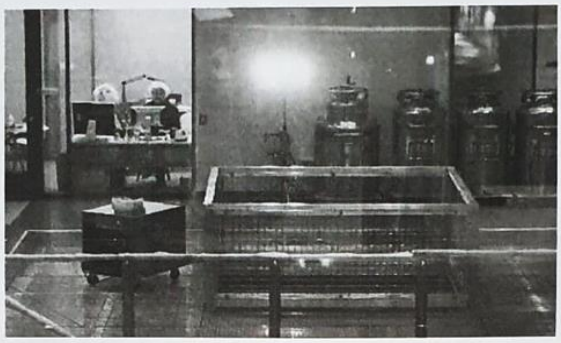
Appendix . Example of 3rd Case

Princeton Üniversitesi laboratuvar kazası sonucu, üç kişi hastaneye sevk edildi!!!



Princeton Üniversitesi Frick Kimya Laboratuvarı'nın B seviyesindeki nükleer manyetik rezonans laboratuarının bir bölümü

Bu öğleden sonra Princeton Üniversitesi Frick Laboratuvarı'nda ani bir yangına ve havaya kimyasal madde karışmasına neden olan bir kazanın ardından üç kişi hastaneye sevk edildi.

Trenton Yangın Departmanı Kaptanı Michael Oakley, doktora sonrası araştırma yapan bir kız öğrencinin deney yaparken yanlışlıkla nitrik asite çözgen atığı eklemesi sonucunda bu öğrencinin, bir başka Princeton öğrencisinin ve bir güvenlik görevlisinin kimyasal tahrişler nedeniyle tedavi altına alındıklarını söyledi.

Olaydan etkilenen bu kişiler, planlanmamış bir kimyasal reaksiyonun çalıştıkları laboratuar ortamına bir miktar buhar açığa çıkarması sonucunda yaşadıkları kimyasal tahrişler nedeniyle hastaneye sevk edildiler.

Michael Oakley, deney sırasındaki bir anda nitrik aside bir çözücü eklendiğini ve bu kimyasallar birbirleriyle uyumlu olmadığından bir kıvılcım ve duman açığa çıktığını söyledi. Oakley, bu reaksiyonun kimyasal maddeyi barındıran kabın kırılmasına ve kadının yüzüne bir miktar maddenin sıçramasına neden olduğunu ifade etti. Ayrıca kadının gözlerinin altında bir kısım yanma hissettiğini ve tahriş olan bölgeyi laboratuarda musluk suyuyla yıkadıktan sonra hastaneye gönderildiğini belirtti. Güvenlik görevlisi, odaya girdikten sonra kollarında kaşıntı ve kızarıklık oluştuğunu söyledi ve diğer öğrenciyle birlikte hastaneye sevk edildi.

Oakley, yangının laboratuarda çıktığını ve havadaki kimyasalların neredeyse hepsinin, öğrencinin deney yaptığı özel bir çeker ocak aracılığıyla bertaraf edildiğini ekledi.

Tehlikeli maddelerin önlenmesine yönelik çalışan Trenton ekibi, turnusol kağıdı ve izleme sayaçlarını kullanarak olay yerinde uçucu organik bileşikler için bir test, kitle tehlike testi ve diğer değerlendirmeleri gerçekleştirdiler. Testler negatif çıktı ve binadaki hava kalitesi iyiydi. Oakley, olayı takiben oda temizliğinin yapılmasının üniversite yetkililerine devredildiğini söyledi. Oda ve binanın geri kalanı, okul yetkilileri tarafından kontrol edildikten sonra yeniden araştırmaya açılmıştır.

Haber kaynağı: https://www.nj.com/mercer/index.ssf/2012/05/princeton_university_laborator.html

A. Örnek olayda geçen kaza neden kaynaklanmıştır?

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