

Assessment of 4th Grade Students' Problem-Solving Skills in Terms of Various Variables¹

Cafer ÇARKIT²

Gaziantep University

Mehmet ÖZENÇ³

Gaziantep University

Abstract

Problem solving is one of the basic skills needed by individuals today. An individual who has attained problem-solving skills can both overcome difficulties in daily life and be successful in professional business life. In this respect, problem solving is considered as a skill that children should attain from an early age. Many variables are effective in the process of teaching problem solving skills. In this study, 4th grade students' perceptions of problem-solving skills were assessed according to the variables of sex, receiving preschool education, parental education status, family type and person helping with school work. Employing the quantitative research method, the study used the descriptive survey design. The Problem-Solving Inventory developed for elementary school children was used to collect data. The inventory is a 5-point Likert type scale consisting of 24 items and three dimensions. The study universe was 4th grade students attending public schools in the central districts of Gaziantep. Because of the size of the universe, transportation, economic difficulties and lack of time, the study was conducted with a sample determined by simple random sampling method, one of the random sampling methods. 744 4th grade students participated in the study. The data of the research were analyzed with the SPSS 15.0 program. According to the study results, no difference was found in students' problem-solving perceptions according to the sex variable. However, students' problem-solving perceptions differ according to the variables of receiving preschool education, mother's education level, father's education level and family type. Also, it was concluded that having someone who helps students with school work makes a significant difference in their problem-solving perceptions. The study results were discussed within the framework of the relevant literature, and late various recommendations were given.

Keywords: Problem Solving, Student, Perception, Variable, Assessment

DOI: 10.29329/epasr.2020.345.14

¹ Part of this study was presented verbally in the 13th International Educational Community Symposium organized in Antalya on 06-08 November 2020.

² Assist. Prof. Dr., Nizip Faculty of Education, Gaziantep University, Gaziantep, Turkey, ORCID: 0000-0003-4126-2165

Correspondence: cafer_carkit_87@hotmail.com

³ Assist. Prof. Dr., Nizip Faculty of Education, Gaziantep University, Gaziantep, Turkey, ORCID: 0000-0001-6339-4092
Email: mozenc38@hotmail.com

Introduction

Today, individuals encounter many problems in their daily lives. In this sense, today's people spend most of their energy and time to solve these problems. This brings the concept of problem solving to the fore. Different definitions about problem solving are given in the literature. According to Korkut (2002), problem solving refers to finding new solutions to solve a problem going beyond the simple application of previous experiences and learned rules. According to Agran and Wehmeyer (1999), problem solving is a skill that gives the individual independence and competence, and forms the basis of learning. Bernardo (1999) stated that problem solving is a process that individuals bring together concepts and processes and use them to solve problems. According to Mithaug (1993), problem solving is a process including the stages of identifying and analyzing problems and developing and implementing solution suggestions in order to solve the problems. Based on these definitions, it can be said that problem solving is a complex process with cognitive, affective and behavioral aspects.

Problem solving is a process in which certain stages are followed within the framework of scientific method. Based on the literature, this process can be summarized as follows (Polya, 1957; Gelbal, 1991; Mayer, 1998; Kökdemir, 2003; Yong & Kiong 2007; Balçı, 2007). The first stage of the problem-solving process is recognizing the problem. At this stage, the individual becomes aware of a problem that bothering him or her and starts the process of thinking on that problem. Because, in order to be able to talk about a problem, there should be a problem disturbing the individual and the individual should be aware of this situation. The second stage of the problem-solving process is defining the problem. At this stage, the problem is clearly defined. The general situation of the problem and its contradictions and sources are revealed. Clarifying the problem and determining its contradictory aspects before solving the problem is an important step in solving the problem (Türnüklü & Yeşildere, 2005). The third stage of the process is determining alternative solutions. At this stage, different solutions that can be used to solve the problem are presented. In this way, different components that can be used in the solution of the problem and that can be arranged and changed according to the results obtained are formed. The fourth stage of the process is solving the problem. At this stage, the problem is tried to be eliminated by using one or more of the previously determined alternative solutions. The last stage of the problem-solving process is checking and interpreting the solution. At this stage, the result and the solution of the problem are checked and interpreted from different perspectives. Thus, this stage is considered as an important stage in the problem-solving process, as it allows the process to be internalized and transferred to different problems.

In today's world, individuals who solve the complex problems of life are needed in every stage of daily life. Studies showed that problem solving is a teachable skill (Verschaffel & De Corte;

1997; Yazgan & Bintaş, 2005; Altun & Arslan, 2006; Cankoy & Darbaz, 2010). In this sense, training individuals who can overcome the problems they may encounter in life is seen as one of the primary goals of education (Soylu & Soylu, 2006). Problem solving with an interdisciplinary approach is an important part of the education process. In the problem-solving process, students should first be taught to understand the problem correctly and then to find a solution by bringing together the concept and solution-oriented processes (Karataş & Güven, 2004; Stayanova, 2005; Xin, 2007). In this context, problem-solving skills and strategies in schools should be attained by students from an early age. In this way, it will be easier to eliminate the factors adversely affecting problem-solving skills.

The social environment, age, family structure and educational background of the individual can be considered as the main factors affecting one's perspective on problems. The problems of the individual become more complex as the age, location and environmental factors change. In the literature, there are studies conducted to determine the problem-solving skills of students at different age groups and education levels and the factors affecting them. In this context, Serin and Derin (2008) examined 8th grade students' perceptions of interpersonal problem-solving skills in terms of different variables. The results of this aforementioned study revealed significant differences between students' perceptions of interpersonal problem-solving skills, and sex, perceived parental attitudes and academic achievement. The study conducted by Yıldırım, Hacıhasanoğlu, Karakurt, & Türkleş (2011) to determine the factors affecting the problem-solving skills of high school students attending 9th, 10th and 11th grades put forth that there was a statistically difference between total problem-solving skill mean scores, and students' sex, grade level, father's education level and occupation, study habits, assessment of school achievement, parental attitude, feeling lonely, being self-confident, and smoking and alcohol use. In their study, Durmaz, Kaçar, Can, Koca, Yeşilova, & Tortumluoğlu, (2007) examined the factors affecting the problem-solving skills of vocational school students. The study determined that the problem-solving skills of students who were seniors, who found their own financial situation sufficient, who spent most of their life in the city and who received training to cope with stress were statistically significantly higher than the other students.

Different from the abovementioned studies, there were studies examining students' problem-solving skills in terms of different variables in the literature (D'Zurilla, & Sheedy, 1992; Meltzer, 2005; Yenice, 2012; Yeşilova, 2013; Kesicioğlu & Güven, 2014). The related studies mostly focused on the problem-solving skills of middle school, high school and university students. Problem solving is a skill that students attain from early childhood with an interdisciplinary approach in line with the contents of the curriculum. Unlike the studies in the literature, the present study examined and assessed the 4th grade students' perceptions of problem-solving skills in terms of sex, receiving preschool education, father's education status, mother's education status, family type and person helping with school work. In this context, the following study questions were formed:

- Do 4th grade students' perceptions of problem-solving skills differ significantly according to the sex variable?
- Do 4th grade students' perceptions of problem-solving skills differ significantly according to the receiving preschool education variable?
- Do 4th grade students' perceptions of problem-solving skills differ significantly according to the mother's education status variable?
- Do 4th grade students' perceptions of problem-solving skills differ significantly according to the father's educational status variable?
- Do 4th grade students' perceptions of problem-solving skills differ significantly according to the family type variable?
- Do 4th grade students' perceptions of problem-solving skills differ significantly according to the person helping with school work variable?

Method

Study Design

Examining the 4th grade students' perceptions of problem-solving skills in terms of sex, receiving preschool education, parental education status, family type and person helping with school work variables, the study employed the descriptive survey design. The descriptive survey model aims the participants meticulously and completely define a situation or phenomenon that they experienced before or they still experience, and also aims to explain the current situation within the framework of different independent variables (Karasar, 2014). In this study, 4th grade students' perceptions of problem-solving skills were examined and described in terms of different variables.

Participants

The study universe was 4th grade students attending schools in the central districts of Gaziantep. In quantitative research, a satisfactory sample is created in accordance with the characteristics of the researched universe (Cohen, Manion & Marrison, 2007; Fraenkel & Wallen, 2009). Because of factors such as the size of the universe, transportation, time and economic limitations, the study was conducted with a sample determined by simple random sampling method. In this sense, the study participants consisted of 744 4th grade students. During the research process, the characteristic left blank in the demographic distribution was not taken into consideration. In this framework, 51.1% (380) of the students in the sample were females and 48.9% (364) were males. 79.80% (591) of the students received preschool education, and 20.20% (150) did not. 79.80% (591) of the participants had between 1-2 siblings, 17.10% (127) between 3-4 siblings, 3.10% (23) had 5 or more siblings. 17.40% (128) of the students' mothers graduated from elementary school, 24.50% (180) from middle school, 30.90% (227) from high school and 27.20% (200) graduated from university and above. In addition, 9.30% (68) of the students' fathers graduated from elementary

school, 25.60% (188) from middle school, 29.90% (220) from high school and 35.20% (259) graduated from university and above. For their school work, 188 of the students (25.30%) were helped by their fathers, 447 (60.16%) by their mothers, 74 (9.96%) by their older brothers or sisters, and 8 (1.08%) by others. There was no one to help 26 (3.50%) students with their school work.

Data Collection Tool

The “Problem Solving Inventory for Elementary School Children” (PSIESC) developed by Serin, Bulut-Serin, and Saygılı (2010) was used to determine students’ perceptions of problem-solving skills. The inventory is a 5-point Likert type scale consisting of 24 items and three dimensions. The first factor of the scale, named trust, consists of 12 items, and its internal consistency coefficient is .85. The second factor, named self-control, consists of seven items, and its internal consistency coefficient is .78. The third factor, named avoidance, consists of five items, and its internal consistency coefficient was calculated as .66. The internal consistency coefficient of the total scale is .80. The values of $\chi^2=621.05$, $df=249$, $\chi^2/df=2.49$, $RMSEA=.051$, $NNFI=.87$, $CFI=.90$, $GFI=.92$ and $AGFI=.90$ obtained in the construct validity of the scale confirmed that the factor structure of the scale was fit. According to the analyses performed by the researchers developing the scale, the scale is a valid and reliable scale that can be used to determine students’ problem-solving perceptions. The necessary permission was obtained from the researchers to use the aforementioned scale.

Data Analysis

SPSS 15.0 program was used to analyze the data obtained during the research process. The normality of the distribution was examined before analyzing the data. The extreme values in the data set were determined by calculating the “z” values of the scale items. In addition, Boxplot plot was also examined. As a result of the analysis, three extreme values whose “z” value was not between +3 and -3 and which were found to be outside the normal distribution in Boxplot graph were removed from the data set. Kurtosis and skewness values were calculated to decide about the normality of the data. According to Tabachnick and Fidell (2013), kurtosis and skewness values in the range of +1.5 to -1.5 indicate that the data are distributed normally. After determining that the data had normal distribution, it was decided to use parametric tests in data analysis. The demographic information of the sample was analyzed by frequency and percentage calculations. Independent samples t-test was performed to determine the differentiation of students’ perceptions of problem-solving skills according to the variables of sex and receiving preschool education, while one-way analysis of variance (ANOVA) was used to determine the differentiation of students’ perceptions of problem-solving skills according to the variables of number of siblings, mother’s education level, father’s education level, family type, and person helping with school work.

Results

In the research process, first, whether the students' perceptions of problem-solving skills differed according to the variables of sex and receiving preschool education was analyzed with independent samples t test. Analysis results are shown in Table 1.

Table 1. T-Test Results Regarding the Differentiation of Students' Perceptions of Problem-Solving Skills According to the Sex and Receiving Preschool Education Variables

Score	Variables	Group	N	x	ss	t	sd	p
Perception of Problem-Solving Total Score	Sex	Female	380	89.11	13.08	1.12	742	.26
		Male	364	88.11	13.33			
	Receiving Preschool Education	Yes	591	86.79	13.32	4.56	739	.000*
		No	150	84.36	11.85			

p<0.05

According to Table 1, 4th grade students' problem-solving skills did not differ significantly according to the sex variable ($p > 0.05$), but differed significantly according to the receiving preschool education variable ($p < 0.05$). The mean scores of the female students were higher than the male students, but this difference did not make a significant difference ($p > 0.05$). The mean scores of those who received preschool education were higher than those who did not, and this created a statistically significant difference ($p < 0.05$). In other words, while the sex variable was not a determining factor in students' problem-solving skills, the variable of receiving preschool education was a determining factor in students' problem-solving skills. Second, in the research process, whether the students' perceptions of problem-solving skills differed according to the variable of number of siblings was examined. Analysis results are shown in Table 2 and Table 3.

Table 2. The Results of One-Way Analysis of Variance (ANOVA) Regarding the Differentiation of Students' Perceptions of Problem-Solving Skills According to the Number of Siblings Variable

Source of Variance	Sum Square	sd	Mean Square	F	p
Between Groups	4304.07	2	2152.04	12.80	.000*
Within Group	124127.3	738	168.19		
Total	128431.3	740			

p<0.05

According to Table 2, there was a significant difference between the groups according to the number of siblings variable ($F_{(738)} = 12.80$, $p < .05$). Post-Hoc multiple comparison analysis was conducted to find out among which groups this difference was present. According to the result of the Levene's test performed to decide which Post-Hoc technique would be applied, the variances were not homogeneous ($L(2-738)=3.48$, $p < .05$). Since the group variances were not equal, Tamhane's T2 analysis was performed. Tamhane's T2 analysis results are presented in Table 3.

Table 3. The Results of the Tamhane's T2 Analysis Performed to Determine the Source of Differentiation of Students' Perceptions of Problem-Solving Skills According to the Number of Siblings Variable

Groups		Average Difference	Standard Error	p
Between 1-2	Between 3-4	5.06*	1.17	0.000
	5 and above	9.45*	2.18	0.001
Between 3-4	Between 1-2	-5.06*	1.17	0.000
	5 and above	4.39	2.35	0.197
5 and above	Between 1-2	-9,45*	2.18	0.001
	Between 3-4	-4.39	2.35	0.197

p<0.05

According to Table 3, there was a significant difference between students with 1-2 siblings, and students with 3-4 and 5 or more siblings in favor of students with 1-2 siblings (p<0.05). In other words, it can be said that the number of siblings was a determining factor in the problem-solving skills of 4th grade students. As the number of siblings increased, students' problem-solving skills decreased. Third, in the research process, the differentiation of students' perceptions of problem-solving skills was examined according to the mother's education level variable. Analysis results are shown in Table 4 and Table 5.

Table 4. One-Way Analysis of Variance (ANOVA) Results Regarding the Differentiation of Students' Perceptions of Problem-Solving Skills According to the Mother's Education Level Variable

Source of Variance	Sum Square	sd	Mean Square	F	p
Between Groups	3528.69	3	1176.23		
Within Group	124116.7	731	169.79	6.93	.000*
Total	127645.4	734			

p<0.05

According to Table 4, there was a significant difference between the groups according to the mother's education level variable ($F_{(731)} = 6.93$, $p < .05$). Post-Hoc multiple comparison analysis was conducted to find out among which groups this difference was present. According to the result of the Levene's test performed to decide which Post-Hoc technique would be applied, the variances were not homogeneous ($L(3-731) = 3.83$, $p < .05$). Since the group variances were not equal, Tamhane's T2 analysis was performed. Tamhane's T2 analysis results are presented in Table 5.

Table 5. The Results of the Tamhane's T2 Analysis Performed to Determine the Source of Differentiation of Students' Perceptions of Problem-Solving Skills According to the Mother's Education Level Variable

Groups		Average Difference	Standard Error	p
Elementary School	Middle School	-.82	1.51	,995
	High School	-3.90	1.51	,061
	University and Above	-5.59*	1.59	,003
Middle School	Elementary School	.82	1.51	.995
	High School	-3.08	1.20	.064
	University and Above	-4.77*	1.30	,002

High School	Elementary School	3.90	1.51	.061
	Middle School	3.08	1.20	.064
	University and above	-1.69	1.30	.723
University and above	Elementary School	5.59*	1.59	.003
	Middle School	4.77*	1.30	.002
	High School	1.69	1.30	.723

p<0.05

According to Table 5, there was a significant difference between students with mother's education level as elementary school and students with mother's education level as university and above in favor of students with mother's education level as university and above, and there was a significant difference between students with mother's education level as middle school and students with mother's education level as university and above in favor of students with mother's education level as university and above ($p < 0.05$). In other words, it can be said that 4th grade students' mothers' education level was a determining factor in the problem-solving skills of 4th grade students. As the education level of the mother increased, the problem-solving skills of the students also increased. Fourth, in the research process, the differentiation of students' perceptions of problem-solving skills was examined according to the father's education level variable. Analysis results are shown in Table 6 and Table 7.

Table 6. One-Way Analysis of Variance (ANOVA) Results Regarding the Differentiation of Students' Perceptions of Problem-Solving Skills According to the Father's Education Level Variable

Source of Variance	Sum Square	sd	Mean Square	F	p
Between Groups	4098.629	3	1366.210		
Within Group	123671.7	731	169.182	8.08	.000*
Total	127770.4	734			

p<0.05

According to Table 6, there was a significant difference between the groups according to the father's education level variable ($F_{(731)} = 8.08$, $p < .05$). Post-Hoc multiple comparison analysis was conducted to find out among which groups this difference was present. According to the result of the Levene's test performed to decide which Post-Hoc technique would be applied, the variances were homogeneous ($L(3-731) = .66$, $p < .05$). Since the group variances were equal, Scheffe analysis was performed. Scheffe analysis results are presented in Table 7.

Table 7. The Results of the Scheffe Analysis Performed to Determine the Source of Differentiation of Students' Perceptions of Problem-Solving Skills According to the Father's Education Level Variable

Groups		Average Difference	Standard Error	p
Elementary School	Middle School	-1.65	1.84	.848
	High School	-3.08	1.81	.404
	University and above	-6.68*	1.77	.003
Middle School	Elementary School	1.65	1.84	.848
	High School	-1,43	1.29	.746

High School	University and Above	-5.03*	1.25	.001
	Elementary School	3.09	1.81	.404
	Middle School	1.43	1.29	.746
University and Above	University and Above	-3.59*	1.19	.029
	Elementary School	6.68*	1.77	.003
	Middle School	5.03*	1.25	.001
	High School	3.59*	1.19	.029

p<0.05

According to Table 7, there was a significant difference between students with father's education level as elementary school, middle school and high school and students with father's education level as university and above in favor of students with father's education level as university and above ($p < 0.05$). In other words, it can be said that 4th grade students' father's education level was a determining factor in the problem-solving skills of 4th grade students. As the education level of the father increased, the problem-solving skills of the students also increased. Fourth, in the research process, the differentiation of students' perceptions of problem-solving skills was examined according to the family type variable. Analysis results are shown in Table 8 and Table 9.

Table 8. One-Way Analysis of Variance (ANOVA) Results Regarding the Differentiation of Students' Perceptions of Problem-Solving Skills According to the Family Type Variable

Source of Variance	Sum Square	sd	Mean Square	F	p
Between Groups	1911.140	2	955.570		
Within Group	127657.2	741	172.277	5.55	.004*
Total	129568.3	743			

p<0.05

According to Table 8, there was a significant difference between the groups according to the family type variable ($F_{(741)} = 5.55$, $p < .05$). Post-Hoc multiple comparison analysis was conducted to find out among which groups this difference was present. According to the result of the Levene's test performed to decide which Post-Hoc technique would be applied, the variances were homogeneous ($L(2-741)=2.62$, $p < .05$). Since the group variances were equal, Scheffe analysis was performed. Scheffe analysis results are presented in Table 9.

Table 9. The Results of the Scheffe Analysis Performed to Determine the Source of Differentiation of Students' Perceptions of Problem-Solving Skills According to the Family Type Variable

Groups		Average Difference	Standard Error	p
Nuclear Family	Extended Family	3.090	1.50	0.120
	Broken Family	9.634*	3.55	0.025
Extended Family	Nuclear Family	-3.090	1.50	0.120
	Broken Family	6.544	3.78	0.224
Broken Family	Nuclear Family	-9.634*	3.55	0.025
	Extended Family	-6.544	3.78	0.224

p<0.05

According to Table 9, there was a significant difference between students with nuclear family and students with broken family in favor of students with nuclear family ($p < 0.05$). In other words, it can be said that 4th grade students' family type was a determining factor in the problem-solving skills

of 4th grade students. In terms of average difference between groups, students with nuclear families had a higher average than students with both extended and broken families. However, there was no statistically significant difference between students with a nuclear family and those with extended families ($p > 0.05$). Finally, in the research process, the differentiation of students' perceptions of problem-solving skills was examined according to the person helping with school work variable. Analysis results are shown in Table 10 and Table 11.

Table 10. One-Way Analysis of Variance (ANOVA) Results Regarding the Differentiation of Students' Perceptions of Problem-Solving Skills According to the Person Helping with School Work Variable

Source of Variance	Sum Square	sd	Mean Square	F	p
Between Groups	2661.925	4	665.481		
Within Group	126852.5	738	171.887	3.87	.004*
Total	129514.4	742			

$p < 0.05$

According to Table 10, there was a significant difference between the groups according to the person helping with school work variable ($F_{(738)} = 3.87$, $p < .05$). Post-Hoc multiple comparison analysis was conducted to find out among which groups this difference was present. According to the result of the Levene's test performed to decide which Post-Hoc technique would be applied, the variances were not homogeneous ($L(4-738) = 1.93$, $p < .05$). Since the group variances were not equal, Tamhane's T2 analysis was performed. Tamhane's T2 analysis results are presented in Table 11.

Table 11. The Results of the Tamhane's T2 Analysis Performed to Determine the Source of Differentiation of Students' Perceptions of Problem-Solving Skills According to the Person helping with School Work Variable

Groups		Average Difference	Standard Error	p
Father	Mother	-0,97	1,21	1
	Brother-sister	0,13	1,79	1
	Other	0,16	5,24	1
	No helper	9,38*	2,76	0,02
Mother	Father	0,97	1,21	1
	Brother-sister	1,1	1,57	1
	Other	1,13	5,17	1
	No helper	10,34*	2,62	0
Brother-sister	Father	-0,13	1,79	1
	Mother	-1,1	1,57	1
	Other	0,03	5,33	1
	No helper	9,25*	2,93	0,03
Other	Father	-0,16	5,24	1
	Mother	-1,13	5,17	1
	Brother-sister	-0,03	5,33	1
	No helper	9,21	5,73	0,77
No helper	Father	-9,38*	2,76	0,02
	Mother	-10,34*	2,62	0
	Brother-sister	-9,25*	2,93	0,03
	Other	-9,21	5,73	0,77

$p < 0.05$

According to Table 11, there was a significant difference between students with father, mother, brother-sister as the person helping with school work, and students with no one to help with school work in favor of students with father, mother, brother-sister as the person helping with school work ($p < 0.05$). In other words, it can be said that 4th grade students having someone to help with their school work causes a significant difference.

Discussion, Conclusion and Recommendations

First, in the study, the differentiation of 4th grade students' perceptions of problem-solving skills was discussed in terms of the sex variable. According to the independent samples t-test results, 4th grade students' perceptions of problem-solving skills did not differ significantly according to the sex variable. The analysis results revealed that the mean scores of female students were higher. However, the difference was not statistically significant. This result is in line with some of the study results from the literature such as Çam (1997), Butcher (1997), Saracaloğlu, Serin, and Bozkurt (2001), Locksmith (2006), Olgun, Öntürk, Karabacak, Aslan, and Serbest (2010), Yenice (2011), Akkaya (2012), Kanbay, Aslan, Işık, and Kılıç (2013), Erdem and Genç (2014), and Sungur and Bal (2016). On the other hand, there are also studies in the literature indicating that problem-solving skills differ according to sex, although they are few in number (Ferah, 2000; Serin & Derin, 2008; Kürtüncü, Ergöl, & Demirbağ, 2013). In this sense, it is believed that the relevant studies worked with specific groups. Based on both the findings in the literature and the results of the present study, it can be stated that problem solving is a skill that does not differ according to sex, and that boys and girls have a similar skill level in problem solving. There may be different problems that boys and girls have to deal with in daily life. According to Heppner and Baker (1997), there are many ways to deal with a problem. In this sense, both male and female students should be taught ways to cope with the problems they may encounter in their lives.

Second, in the study, the differentiation of 4th grade students' perceptions of problem-solving skills was discussed in terms of the receiving preschool education variable. The results of the independent samples t-test revealed that 4th grade students' perceptions of problem-solving skills differ significantly according to the variable of receiving preschool education. In this framework, similar results are encountered in the literature. The study conducted by Aslanargun and Tapan (2012) determined that the self-expression skills of students who received preschool education improved, they did not have difficulty during communication, and they were more proficient in academic and social areas. Similarly, a direct relationship was found between variables such as communication, desire to learn, motivation, and duration of attending preschool education (Killen & Smetana, 1999; McCabe & Altamura, 2011). Based on these results, it can be stated that preschool education is an effective variable on students' problem-solving skills. It is believed that increasing the schooling rate

in preschool education is an important step in raising individuals who can overcome the problems encountered in daily life.

Third, in the study, the differentiation of 4th grade students' perceptions of problem-solving skills was discussed in terms of the number of siblings variable. The results of the one-way analysis of variance (ANOVA) put forth that 4th grade students' perceptions of problem-solving skills differed significantly according to the number of siblings' variable. In this sense, the mean score of the problem-solving skill perceptions of the students with 1-2 siblings was found to be significantly higher than the mean scores of the students with more siblings (between 3-4, and 5 and above). The findings of the study conducted by Savcı and Aysan (2014) support these results of the present study. On the other hand, unlike these studies, Düzakın (2004); Locksmith, (2006); Çağlayan, Taşgın, & Yıldız, (2008) revealed that the number of siblings does not affect students' problem-solving skills. This difference is considered to be associated with the age groups the studies were conducted with. It is believed that the problem-solving skills of students are positively affected as a result of the increase in the interest of mothers and fathers due to the decrease in the number of siblings at the elementary school level.

Fourth, in the study, the differentiation of 4th grade students' perceptions of problem-solving skills was discussed in terms of the mother's education level variable. The results of the one-way analysis of variance (ANOVA) revealed that 4th grade students' perceptions of problem-solving skills differed significantly according to the variable of mother's education level. In this sense, it can be stated that the education level of the mother is an effective variable in the perceptions of students' problem-solving skills, and that as the education level of the mother increases, the students' perceptions of problem-solving skills also increase. This finding is in line with the findings in the literature presented by Saygılı (2000), Eroğlu (2001), Ünüvar (2003), Akbaş (2005), Hamarta, (2007) and Sungur and Bal (2016). It is believed that the main factors of this difference are that mothers who have university and above education spend more effective and quality time with their children and also increase their motivation and guide them in the process of problem solving.

Fifth, in the study, the differentiation of 4th grade students' perceptions of problem-solving skills was discussed in terms of the father's education level variable. The results of the one-way analysis of variance (ANOVA) revealed that 4th grade students' perceptions of problem-solving skills differed significantly according to the father's education level variable. In this sense, it can be stated that the father's education level is an effective variable in students' perceptions of problem-solving skills, and that as the father's education level increases, the students' perceptions of problem-solving skills also increase. While this result is in line with the findings in the literature presented by Saygılı (2000), Genç and Kalafat (2007), Çağlayan et al. (2008), and Yıldırım et al. (2011), this result is not parallel with the findings in the literature presented by Korkut (2002), Hamarta, (2007), Serin and

Derin, (2008), and Sungur and Bal (2016). Due to the fact that this study was conducted at the elementary school level, it is believed that as the education level increases, fathers spend more effective and quality time with their children, just like mothers, and this positively reflects on the problem-solving processes of elementary school students. It is believed that elementary school students living apart from their mothers or fathers in broken families are emotionally affected, have difficulty in stress management, and consequently, they have difficulty in showing sufficient and necessary motivation in the problem-solving process. Studies (Eisenberg, Shepard, Fabes, Murphy, & Guthrie, 1998; Findlay, Coplan, & Bowker, 2009; Burgess, Wojslawowicz, Rubin, Krasnor, & LaForce, 2006) put forth that stressed individuals with high social anxiety use avoidance behavior frequently. It can be stated that in broken families, students have high levels of anxiety and stress, and consequently, they exhibit more avoidance behaviors and have difficulties during the problem-solving process.

Finally, in the study, the differentiation of 4th grade students' perceptions of problem-solving skills was discussed in terms of the person helping with school work variable. The results of the one-way analysis of variance (ANOVA) revealed that 4th grade students' perceptions of problem-solving skills differed significantly according to the person helping with school work variable. Among students who are helped by their fathers, mothers and brother-sister with their school work and students who cannot get help with their school work, this difference was in favor of the students who are helped by their fathers, mothers and brother-sister with their school work. This result is considered important in terms of showing that providing students with the necessary guidance in their school work has a positive effect on their problem-solving process. The important thing here is not to solve students' problems instead of them, but to be a role model for them in problem solving and to provide the right guidance.

Based on the study results, it can be stated that factors such as mother, father, preschool education and guiding students with their school work are very important in the problem-solving processes of elementary school students. In this sense, educational environments should be created to develop students' problem-solving skills right from elementary school. Necessary works should be done by the counseling service for students who are deemed insufficient in solving problems, and these students should be supported in solving daily life problems. When necessary, informative works should be carried out for the families of these students, and awareness should be raised on issues like the effect of factors such as parents' attitudes and family structure in students' problem-solving processes. Based on the results of the present study, the following recommendations can be given to the researchers.

- In this study, 4th grade students' perceptions of problem solving were assessed in terms of different variables. Similar studies can be conducted with students at the middle school, high school and higher education levels.

- This study employed the descriptive survey design. Unlike this study, students' problem-solving perceptions can be examined employing the relational survey design by taking into account different variables (creative thinking, critical thinking, personality type, academic achievement, functional literacy, etc.).

- Action researches can be conducted to improve students' problem-solving levels at the middle school, high school and higher education levels.

- Textbooks used at the elementary school, middle school and high school levels can be assessed in terms of their adequacy to provide students with problem-solving skills.

- Projects can be carried out to improve the problem-solving levels of students from rural areas.

References

- Agran, M. & Wehmeyer, M. (1999). *Teaching problem solving to students with mental retardation*. American Association on Mental Retardation.
- Akbaş, S.C. (2005). A research on the social problem-solving skills of six-year-old children continuing to preschool education (Unpublished Master's Thesis). Hacettepe University, Ankara.
- Akın, S., Güngör, İ., Mendi, B., Şahin, N., Bizat, E., & Durna, Z. (2007). Nursing student's problem-solving skills and internal-external locus of control. *Journal of Education and Research in Nursing*, 4(2), 30-36.
- Akkaya, K. (2012). The relationship between the perceived problem-solving level and self-concept of secondary school students. (Unpublished Master's Thesis). Yeditepe University, İstanbul.
- Altun, M. & Arslan, Ç. (2006) A study on learning of the problem-solving strategies by secondary school students. *Journal of Uludag University Faculty of Education*, 19(1), 1-21.
- Aslanargun, E. & Tapan, F. (2012). Preschool education and its' effects on children. *Bolu Abant İzzet Baysal University Journal of Faculty of Education*, 11(2), 219-238.
- Balcı, G. (2007). The examination of metacognitive skills of fifth grade students in terms of their levels of solving verbal math problems (Unpublished Master's Thesis). Çukurova University, Adana.
- Bernardo, A., B. (1999). Overcoming obstacles in understanding and solving word problems in mathematics. *Educational Psychology*, 19(2), 149-163. <https://doi.org/10.1080/0144341990190203>
- Burgess, K.B., Wojslawowicz, J. C., Rubin, K. H., Rose-Krasnor, L. & Booth-Laforce, C. (2006). Social information processing and coping strategies of shy/withdrawn and aggressive children: Does friendship matter? *Child Development*, 77(2), 371-383. <https://doi.org/10.1111/j.14678624.2006.00876.x>
- Cankoy, O. & Darbaz, S. (2010). Effect of a problem posing based problem-solving instruction on understanding problem. *H. U. Journal of Education*, 38(38), 11-24.
- Cohen, L., Manion, L. & Morrison, K. (2007). *Research methods in education*. Routledge.
- Çağlayan, H. S., Taşgın, Ö. & Yıldız, Ö. (2008). Analyzing skills of solving problems of high schools' students who are doing sports from different angles considering variables. *Nigde Ömer Halisdemir University Journal of Physical Education and Sports Sciences*, 2(1), 62-77.

- Çam, S. (1997). The Effect of communication skills training programme with teacher candidates, on ego states and perception of problem-solving skill (Unpublished Doctoral Dissertation). Ankara University, Ankara.
- Çilingir, A. (2006) The comparison between high school and high school of science students' social and problem-solving skills (Unpublished Master's Thesis). Atatürk University, Erzurum.
- Durmaz, Ş., Kaçar, Z., Can, S., Koca, R., Yeşilova, D. & Tortumluoğlu, G. (2007). Problem solving skills of the students at health high school and the factors affecting them. *Journal of Anatolia Nursing and Health Sciences*, 10(4), 63-71.
- Düzakın S. (2004). The examination on the ability of solving problems of high school students according to some variables (Unpublished Master's Thesis). Gazi University, Ankara.
- D'Zurilla, T. J. & Sheedy, C. F. (1992). The relation between social problem-solving ability and subsequent level of academic competence in college students. *Cognitive Therapy and Research*, 16(5), 589-599. <https://doi.org/10.1007/BF01175144>
- Eisenberg, N., Shepard, S.A., Fabes, R.A., Murphy, B.C. & Guthrie, I.K. (1998). Shyness and children's emotionality regulation and coping: Contemporaneous longitudinal and across-context relations. *Child Development*, 69, 767- 790. <https://doi.org/10.1111/j.1467-8624.1998.00767.x>
- Erdem, A., R. & Genç, G. (2014). High school students' opinions of problem-solving skills. *Turkish Journal of Educational Studies*, 1(2), 1-21.
- Eroğlu, E. (2001). The effect of family on the development of problem-solving abilities of children (Unpublished Master's Thesis). Sakarya University, Sakarya.
- Ferah, D. (2000). Investigation of perception of problem-solving skills and problem-solving approaches of the Turkish Army Academy cadets in terms of gender, grade, academic success and being leader (Unpublished Master's Thesis). Hacettepe University, Ankara.
- Findlay, L.G., Coplan, R. J. & Bowker A. (2009). Keeping it all inside: Shyness, internalizing coping strategies and socio-emotional adjustment in middle childhood. *International Journal of Behavioral Development*, 33(1), 47-54. <https://doi.org/10.1177/0165025408098017>
- Fraenkel, J. R. & Wallen, N. E. (2009). *How to design and evaluation research in education*. McGraw-Hill.
- Gelbal, S. (1991). Problem solving. *H. U. Journal of Education*, 6, 167-173.
- Genç, S. Z., & Kalafat, T. (2007). The research on evaluation of prospective teachers' democratic attitudes and problem-solving skills according as different variables. *Pamukkale University Journal of Education*, 22(22), 10-22.
- Hamarta, S. (2007). Social problem-solving skills of elementary 8th level student's investigation according to perceived mother and father attitude (Unpublished Master's Thesis). Selçuk University, Konya.
- Heppner, P. P. & Baker, C. E. (1997). Applications of the problem-solving inventory. *Measurement and evaluation in counseling and development*, 29(4), 229-241. <https://doi.org/10.1080/07481756.1997.12068907>
- Kanbay, Y., Aslan, Ö., Işık, E. & Kılıç, N. (2013). Problem solving and critical thinking skills of undergraduate nursing students. *Journal of Higher Education and Science*, 3(3), 244-251. <https://doi.org/10.5961/jhes.2013.083>

- Karasar, N. (2014). *Scientific research method*. Nobel Publication.
- Karataş, İ. & Güven, B. (2004). Determination of 8th students' problem-solving skills: A case study. *Journal of National Education*, 163.
- Kasap, Z. (1997). The Relation between success and manner of primary school 4th year students in problem solving according to the socio-economic level (Unpublished Master's Thesis). Marmara University, İstanbul.
- Kesicioğlu, O. S. & Güven, G. (2014). Investigation of the correlation between preservice early childhood teachers' self-efficacy levels and problem-solving empathy and communication skills. *Electronic Turkish Studies*, 9(5). 1371-1383. <http://dx.doi.org/10.7827/TurkishStudies.6784>
- Killen, M. & Smetana, J. G. (1999). Social interactions in preschool classrooms and the development of young children's conceptions of the personal. *Child Development*, 70(2), 486-501. <https://doi.org/10.1111/1467-8624.00035>
- Korkut, F. (2002). Problem solving skills of high school students. *H. U. Journal of Education*, 22, 177-184.
- Kökdemir, D. (2003). Decision making and problem solving under uncertainty (Unpublished Doctoral Dissertation). Ankara University, Ankara.
- Kürtüncü, M., Ergöl, Ş. ve Demirbağ, B., C. (2013). Implementation of problem-solving inventory in children 10-14 age group. *TAF Preventive Medicine Bulletin*, 12(5), 545-552. <https://doi.org/10.5455/pmb.1-1355495719>
- Mayer, R. E. (1998). Cognitive metacognitive and motivational aspects of problem solving. *Instructional Science*, 26, 49-51. <https://doi.org/10.1023/A:1003088013286>
- McCabe, P. C. & Altamura, M. (2011). Empirically valid strategies to improve social and emotional competence of children. *Psychology in the Schools*, 48(5), 513-540. <https://doi.org/10.1002/pits.20570>
- Meltzer, D. E. (2005). Relation between students' problem-solving performance and representational format. *American Journal of Physics*, 73(5), 463-478. <https://doi.org/10.1119/1.1862636>
- Mithaug, D. E. (1993). *Self-regulation theory*. Praeger.
- Olgun, N., Öntürk Z., Karabacak, Ü., Aslan, F. & Serbest, Ş. (2010). Problem solving skills of the nursing students: Results of the 1-year observation problem solving skills of the students *Acibadem University Health Sciences Journal*, 1(4), 188-194.
- Polya, G. (1957). *How to Solve It?* (2nd ed.). Princeton University Press
- Saracaloğlu, A. S., Serin, O. & Bozkurt, N. (2001) The relationship between the problem-solving skills and the achievement of graduate students of the graduate school of educational sciences. *Marmara University Atatürk Education Faculty Journal of Educational Sciences*, 14, 121-134.
- Savcı, M. & Aysan, F. (2014). The relationship between the perceived stress level and the stress coping strategies in university students. *International Journal of Turkish Education Sciences* 3, 44-56.
- Saygılı, H. (2000), The examination of relationship between the skill of problem solving and social and individual adjustment (Unpublished Master's Thesis). Atatürk University, Erzurum.

- Serin, N. B. & Derin, R. (2008). The factors affecting primary school students' perceptions of interpersonal problem-solving skills and the levels of locus of control. *International Journal of Human Sciences*, 5(1), 1-18.
- Serin, O., Bulut-Serin, N. & Saygılı, G. (2010). Developing problem solving inventory for children at the level of primary education (PSIC). *Elementary Education Online*, 9(2), 446-458.
- Soylu, Y. & Soylu, C. (2006). The role of problem solving in mathematics lessons for success. *Inonu University Journal of the Faculty of Education*, 7(11), 97-111.
- Stoyanova, E. (2005). Problem solving strategies used by years 8 and 9 students. *Australian Mathematics Teacher*, 61(3), 6-11.
- Sungur, G. & Bal, P. N. (2016). Analysis of 4th grade students' problem-solving skills in terms of several variables. *Journal of Education and Practice*, 7(14), 1-9.
- Tabachnick & Fidell (2013). *Using Multivariate Statistics* (Sixth ed.). Pearson.
- Türnüklü, E. B. & Yeşildere, S. (2005). Problem, problem solving and critical thinking. *Gazi University Journal of Gazi Educational Faculty*, 25(3), 107-123.
- Ünüvar, A. (2003). The effect of formal various perceived social support on the self-esteem and problem-solving abilities of high school students at the age of fifteen to eighteen (Unpublished Master's Thesis). Selçuk University, Konya.
- Verschaffel, L. & De Corte E. (1997). Teaching realistic mathematical modeling in the elementary school: a teaching experiment with fifth graders. *Journal for Research in Mathematics Education*, 28, 577-601.
- Xin, P. Y. (2007). Word problem solving tasks in textbooks and their relation to student performance. *The Journal of Educational Research*, 100(6), 347-359. <https://doi.org/10.3200/JOER.100.6.347-360>
- Yazgan, Y. & Bintaş, J. (2005). Fourth and fifth grade students' levels of using problem solving strategies: A reaching experiment. *H. U. Journal of Education*, 28 (28), 210-218.
- Yenice, N. (2011). Investigating pre-service science teachers critical thinking dispositions and problem-solving skills in terms of different variables. *Educational Research and Reviews*, 6(6), 497-508.
- Yenice, N. (2012). Investigation the self-efficacy and problem-solving skills of preservice teachers. *Electronic Journal of Social Sciences*, 11(39), 36-58.
- Yeşilova, Z. (2013). The seventh-grade students' problem solving behaviours and problem-solving achievement levels (Unpublished Master's Thesis). Marmara University, İstanbul.
- Yıldırım, A., Hacıhasanoğlu, R., Karakurt, P. & Türkleş, S. (2011). Problem solving skills and influential factors in high school students. *International Journal of Human Sciences*, 8(1), 905-921.
- Yong, H. T. & Kiong, L. N. (2007). Metacognitive aspects of mathematics problem solving. Third East Asia Regional Conference on Mathematics Education (ICMI Regional Conference). Mara University of Technology, Malaysia.