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Research Article

Examination of Mathematics Course Achievements of Students who Took the High School Entrance Exam in terms of Different Factors

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Abstract

The main purpose of this research is to examine the mathematics course achievement levels of students who take the high school entrance exam according to some variables. For this purpose, the data of the research were collected with the help of a questionnaire prepared by the researcher. The descriptive survey model, which is a quantitative method, was used in the research. The research was carried out in the first semester of the 2018-2019 academic year. The sample of the study consisted of a total of 417 students studying in the 9th grade of different high schools in Tatvan central district of Bitlis province and taking the high school entrance exam. Data analysis was performed by t-test and single-factor analysis of variance (ANOVA). As a result of the analysis; It was determined that the mathematics course achievement levels of the students who took the high school entrance exam did not differ significantly according to the gender variable, but there were significant differences according to the school type, mother and father education level, monthly income level and whether there was a computer-internet at home. Some suggestions were made based on the research results.

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Introduction

One of the main goals of our national education is to train students with the qualifications and competencies required by the rapidly developing information age. Today, keeping up with the rapidly globalizing world has made it necessary to make some innovations in our understanding of education in order to keep up with the changes. In order to understand the success of these innovations in the education system on students, measurement and evaluation studies are carried out by using national and international questionnaires and tests at different grade levels (Özer & Anıl, 2011). Today, many measurement and evaluation systems are applied in the world. Turkey regularly participates in PISA and TIMMS applications, which are among the international education researches,

which are preferred mostly by European countries but whose number has increased with the participation of states from different continents over time. PISA is a survey by the Organization for Economic Co-operation and Development (OECD) that evaluates the knowledge and skills of 15-year-old students in three-year terms. TIMSS is a survey research applied to 4th and 8th grade students every four years to evaluate the knowledge and skills acquired by students in the fields of mathematics and science (MoNE, 2019).

Secondary education institutions aiming to make students have a profession according to their interests and abilities and to prepare them for business life or higher education institutions have been conducting exams in our country for many years regarding student selection (Karakaya, Arık, Çimen, & Yılmaz, 2019). These exams, which started with school-based student selection in Maarif Colleges for the first time in 1955 (Güven, 2010), left their place to central exams as the needs and expectations of the society changed. As a matter of fact, High School Entrance Examination (HSEE-LGS) between1997-2004, Secondary Education Institutions Selection and Placement Examination (SEISPE-OKS) between 2005-2008, Multiple Placement Examination (MPE-SBS) between 2008-2011, 2011-2013 Between the years of years, the Single Placement Examination (SPE-SBS) exam was applied. With the transition to 12-year compulsory education in the 2013-2014 academic year, the Transition Exam from Basic Education to Secondary Education (TEBESE-TEOG) started to be implemented. As of 2017-2018, the Transition System to High Schools (TSHS -LGS) has been introduced instead of the TEOG exam, and the placement of students in secondary education institutions is still based on these LGS scores (Dönmez & Dede, 2020).

The Ministry of National Education evaluates student achievement by participating in assessment and evaluation studies carried out at both national and international levels in our country (Özer & Anıl, 2011). International exams such as PISA, TIMSS and PIRLS allow us to see our situation in the international arena and allow us to take measures by comparing the situation in our country with other nations (Okutan & Daşdemir, 2018). When the PISA 2003 and 2006 results are analyzed, it is seen that Turkey is far behind OECD countries in the field of mathematics. Turkey was only able to take place in the second of the six levels determined by the average of 423 mathematics points (Aydın, Sarıer, & Uysal, 2012). According to the PISA 2015 mathematical literacy results, the average for Turkey is 420 and the average for all countries is 461 (MoNE, 2016). However, according to the 2018 PISA preliminary report, Turkey performed very close to the mathematics field average with an

average of 454 points (MoNE, 2019). Again, when the TIMSS 1999 national report is examined, Turkey was ranked 31st among 38 countries participating in the project in the mathematics test (MoNE, 2019). According to the TIMSS 2007 national mathematics and science report, Turkey's mathematics achievement average score is 432, which is below the TIMSS 2007 evaluation criterion of 500 points (MoNE, 2007). According to the TIMSS 2011 and 2015 national Mathematics and Science report of eighth graders, it is seen that Turkey's mathematics achievement average is below the TIMSS scale midpoint (MoNE, 2015). According to the TIMSS 2019 Turkey preliminary report, it performed at the TIMSS midpoint level with 496 points in the 8th grade mathematics assessment. With this performance, Turkey ranked 20th among 39 countries (MoNE, 2019).

In other words, the fact that the scores of Turkey in exams such as the Program for International Student Assessment (PISA) and the International Mathematics and Science Trends Survey (TIMSS) are not at the desired level have led to the re-examination of education, training and assessment and evaluation systems (Gündoğdu, Kızıltaş & Çimen, 2010). Although these exam results are associated with students not being successful enough by some educational institutions and teachers, some sources draw attention to the situation of students who are successful in national exams but not enough in international exams, and related this situation to the fact that Turkish students are not accustomed to such questions (Aydoğdu-İskenderoğlu & Baki, 2011). Therefore, the necessity for students in Turkey to encounter more problems similar to those used in exams such as PISA and TIMSS has emerged, and there has been a need for some changes in the problem types used in national exams. One of the steps taken at this point is the abolition of the Transition from Basic Education to Secondary Education (TBESE-TEOG) exam, which has been applied as a transitional exam to secondary education since 2014, and the replacement of the High School Entrance Exam (HSEE-LGS), which was put into practice in the 2017-2018 academic year. One of the important changes in the new examination system is the use of problems that will "measure the student's reading comprehension, interpretation, deduction, problem solving, analysis, critical thinking, scientific process skills and similar skills" (MoNE, 2018). The problem type used here is quite different from the problem types students face in previous exams (TEOG) and written exams at school (Biber, Tuna, Uysal, & Kabuklu, 2018). As understood from these studies, PISA and TIMMS data not only provide information about the variables affecting students' mathematics and science achievement, but also enable

countries to evaluate their own education systems from different perspectives (Ceylan & Berberoğlu, 2007).

One of the important components of the education system is measurement and evaluation activities. Decision-making about the accuracy, realism, adequacy, suitability, effectiveness, efficiency and success of the training programs is made through evaluation (Demirel, 2004). While measurement activities provide important results in terms of seeing how much of the determined targets have been met, some decisions are taken with ongoing evaluation activities in a planned manner (Carter & Norwood, 1997; cited in Güler et al., 2019). While the evaluations made during the education process make it possible to see the learning deficiencies and failing aspects more clearly, the evaluations made at the end of the education enable to determine to what extent the students have acquired the critical behaviors expected at the end of the process (Atılgan, Kan, & Aydın, 2017). Therefore, to get to the root of the problem; It is necessary to examine the teaching processes of the mathematics course and to investigate whether the teaching at school is sufficient to be successful in the central exams (Çelikel & Karakuş, 2017).

When the literature is examined, many studies examining the mathematics achievement of students in previous exam systems have been found (Çelikel & Karakuş, 2017; Özer & Anıl, 2011). However, almost no study has been found that examines the success of students in the mathematics test in the high school entrance exam, which was applied for the first time in the 2017-2018 academic year. It is possible that the LGS system, which has replaced the TEOG system, may have positive or negative results like the previous exams. For the success of an exam model with positive and negative results, the negative features of the exam model should be eliminated or necessary steps should be taken to make students less affected by the negative results of this exam model. From here, it can be said that the success of an exam model is directly proportional to the success of the students to whom that exam is applied (Metin, 2013). In this context, it is very important to determine the success levels of the students in the mathematics course within the application area of the newly implemented LGS exam system. Because, especially in the field of mathematics education, the poor academic performance of students is considered as the most important problem in this field and it is seen as a subject that should be emphasized frequently (Algani & Eshan, 2019; Peker & Mirasyedioğlu, 2003; Walshatri, Wakil, & Bakhtyar, 2019). There is no doubt that the effectiveness of mathematics education can be significantly improved if the

variables known as important predictors of motivation in mathematics are adequately addressed. In addition, it is important to determine the variables that affect students' mathematics motivation levels in the high school period, when the infrastructure for success in higher education is established. Because, the high school period coincides with the abstract operational period, which is the highest level in which the individual perceives his environment, interprets it and accordingly mental activities develop. It is a period in which a person's reasonable and scientific thinking skills develop (Yöndem & Taylı, 2011). Similarly, poor academic performance is among the main concerns of teachers, curriculum developers and stakeholders across the entire education sector. Because poor academic performance can negatively affect students' active participation in future national developments, their access to higher education institutions and their ability to find employment in the highly competitive job market. It is very important to share information with the stakeholders involved in the determination of education policies in order to determine the factors that contribute positively to the academic performance of the students and to start the struggle process quickly. For this reason, the main purpose of this study is to recognize possible problems in the current examination system process and to take measures to eliminate these problems for the students who will take the exam, and as a result, to increase the success scores of the students in the mathematics course in the LGS exams. Again, it is thought that the results of the research will contribute significantly to the studies aiming to reveal the variables related or unrelated to the success of the students in the central exams related to secondary education.

Aim of Study

The aim of this research is to examine the students who took the high school entrance exam (HSEE-LGS) in the 2018-2019 academic year in terms of different variables such as gender, school type, father and mother education status, family income level and whether there is a computer-Internet at home, which are thought to affect the success levels of mathematics courses. For this, the following questions guided the study.

1. Is there a significant difference between the mathematics course achievements of the students who took the high school entrance exam (HSEE-LGS) according to the gender variable?

2. Is there a significant difference between the mathematics course achievements of the students who took the high school entrance exam (HSEE-LGS) according to the school type?

3. Is there a significant difference between the mathematics course achievements of the students who took the high school entrance exam (HSEE-LGS) according to the education level of the father?

4. Is there a significant difference between the mathematics course achievements of the students who took the high school entrance exam (HSEE-LGS) according to their mother's education level?

5. Is there a significant difference between the mathematics course achievements of the students who take the high school entrance exam (HSEE-LGS) according to the monthly income level of the family?

6. Is there a significant difference between the mathematics course achievements in the high school entrance exam (HSEE-LGS) according to the computer-internet status of the students at home?

Method

Model of the Research

In this descriptive study, which was carried out in order to examine the factors affecting the mathematics course success level of students who took the High School Entrance Examination (HSEE-LGS), in terms of different variables, the survey model was used. This model is the scanning arrangements made on the whole universe or the sample to be taken from it in order to reach a general conclusion about a universe consisting of many numbers (Karasar, 2005).

Research Group

The population of the research consisted of all 9th grade students in the Tatvan district center of Bitlis province, and the sample of the research consisted of a total of 417 students studying in the 9th grades of different high schools in the 2018-2019 academic year with the random sampling method. The reason for choosing the 9th grade students in the research is that the 9th grade students took the LGS exam in the 2018-2019 academic year. In the questionnaire applied to these students, they were asked which secondary school they graduated from and according to the answers given by the students, they were classified as school types (General Secondary School, religious secondary school, Private Secondary

School). The sample group of the study consisted of 417 students, 61.3% (N=252) of whom were female and 38.7% (N=165) was male. 31.9% (N= 146) of the students were graduated from general secondary school, 37.8% (N=157) from Imam Hatip secondary school and 30.3% (N=114) from private secondary school.

Data Collection Tool

The data of the research were obtained by the questionnaire form developed by the researcher. In this questionnaire, questions such as the gender of the student, the secondary school they graduated from, the education level of the father, the education level of the mother, whether there is an internet-computer at home and the monthly income of the family were included. Again, in the questionnaire, the number of correct and incorrect answers in the mathematics (20 questions) subtest in the high school entrance exam was also included. The questionnaire developed by the researcher was finalized in line with the opinions of the experts in the field of mathematics education. Afterwards, a pilot study was conducted with 150 students who wanted to participate voluntarily among the students who formed the sample of the study and no negative situation was encountered. After obtaining the necessary permission from the District Directorate of National Education for the application of the finalized questionnaire, it was applied to the students. The questionnaire form was applied by the researcher and during the data collection, the participants were informed about how to fill in the data collection tool and enough time was given to them.

Analysis of Data

The data obtained in the research were analyzed using the SPSS 17.0 package program. Average score, standard deviation and percentage calculations were calculated according to the answers given by the students who participated in the survey. Mathematics success scores of students were found by using the MEB's score calculation system. (The raw scores were calculated by adding the correct and incorrect answers given by the students to the math subtest questions separately and subtracting one third of the wrong answers from the number of correct answers, raw scores were converted into standard scores and Weighted standard scores were calculated using the weighted coefficient determined for the mathematics subtest…). In this way, the mathematics achievement score was calculated for each student. Mathematics course success scores of students; It was analyzed and interpreted according to variables such as gender, father's education level, mother's education level, whether there is internet-computer at home and monthly income of the family. Parametric

tests were used because the data of the study were more reliable. Parametric tests are more flexible and powerful than non-parametric tests. They are helpful in examining the effects of many independent variables on the dependent variable, as well as examining their relationships with each other. It is more appropriate to use parametric techniques for a suitable and robust data (Kalaycı, 2006, p.85). In addition, homogeneity of variances and normality of distribution were taken into account. In the analysis of the data, the t-test for two variables and the one-factor ANOVA test for more than two variables were used. If the difference between the variables was significant in the analysis of the data, the Scheffe test was used to determine between which groups this difference was. The significance level was evaluated as .05.

Finding

In this part of the research, the findings obtained as a result of the analysis of the data are included.

Regarding the first question whose answer is sought in the research, the results of the t-test regarding whether the mathematics course achievement mean scores of the students who took the LGS exam are significant according to the gender variable are given in Table 1.

Table 1. t-test results of students' mathematics course achievement mean scores according to gender variable

Gender	N	$\overline{X}$	S	sd	t	p
Male	165	53,16	14,86	415	1,24	,22
Female	252	55,13	16,51			

When Table 1 is examined, it is seen that there is no significant difference between the students' mathematics course achievement mean scores according to the gender variable [t(415)= 1,24, p >.05]. However, the mathematics course achievement mean score of girls ($\overline{x}$=55,13) is higher than the mean score of boys ($\overline{x}$=53,16). From this point of view, it can be said that the gender variable does not have a significant effect on the mathematics course exam success scores of the students.

Regarding the second question, the answer of which is sought in the research, the one-way Anova results applied to determine whether the school type has a significant contribution to the students' LGS mathematics course achievement scores are given in Table 2.

Table 2. The results of the students' mathematics course success average according to the school type

Type of School	n	$\overline{X}$	sd
General Secondary School	146	49,50	14,88
İmam Hatip secondary School	157	54,56	16,12
Private Secondary School	114	60,27	14,86
Total	417	54,35	15,89

When Table 2 is examined, the average scores of students in mathematics course according to school type; General Secondary School ($\overline{x}$= 49,50), İmam Hatip Secondary School ($\overline{x}$= 54,56) and Private Secondary School ($\overline{x}$= 60,27). According to these results, it can be said that the mathematics course achievement score average of the students studying in Private School is higher than the average score of İmam Hatip Secondary School and General Secondary School students. The results of the Scheffe test analysis, which was conducted to test the statistical significance of this difference between the students' mathematics achievement scores, are given in Table 3.

Table 3.ANOVA results of students' mathematics course achievement scores by school type

Source of Variance	Sum of Squares	Sd	Mean of Squares	F	P	Difference
Intergroup	7443,41	2	3721,70	15,79	,00	1 – 2
Withingroups	97591,11	414	235,73			1 - 3
Total	105034,52	416				2 - 3

1. Private Secondary School 2. Imam Hatip Secondary School 3. General Secondary School

According to Table 3, a statistically significant difference was found between the mathematics course achievement mean scores of the students according to the school type [F(2-414) = 15,79 p < 0.05]. According to the results of the Scheffe test, which was conducted to determine between which school types this significant difference exists, the mathematics course achievement averages of private secondary school students are significantly higher than the averages of İmam Hatip secondary school and general secondary school students. In addition, it was found that the mathematics course achievement mean score of the İmam Hatip secondary school students was significantly higher than the mean score of the general secondary school students.

Regarding the third question, the answer of which is sought in the research, the one-way ANOVA results applied to determine whether the father's education level has a significant contribution to the mathematics course success of the students who took the LGS exam are given in Table 4.

Table 4. The results of the students' mathematics course success average according to the education level of the father

Education Level	n	$\overline{X}$	Sd
Literate	31	45,54	14,40
Primary School	106	49,31	14,68
Secondary School	109	54,55	13,94
Hihg School	103	56,15	15,89
Üniversity	68	63,18	16,70
Total	417	54,35	15,89

When Table 4 is examined, the average scores of the students' LGS mathematics course exam points according to the education level of the father; Literacy ($\overline{x}$=45,54) was found as primary school ($\overline{x}$= 49,31), secondary school ($\overline{x}$=54,55), high school ($\overline{x}$= 56,15) and university ($\overline{x}$=63,18). According to these findings, it is seen that as the education level of the father increases, the mathematics course exam success of the students also increases. According to the education level of the father, there is a difference between the mathematics course success averages of the students. The results of the Scheffe test performed to test whether this difference is statistically significant are given in Table 5.

Table 5.ANOVA test results regarding students' mathematics course achievement scores according to father's education level

Source of Variance	Sum of Squares	Sd	Mean of Squares	F	P	Difference
Intergroup	10735,42	4	2683,86	11,73	,00	5 –1, 5-2
Withingroups	94299,09	412	228,88			5 - 3, 5-4
Total	105034,52	416				4 - 1, 4-2

1. Literate 2.Primary School 3.Secondary School 4.High School 5. University

When Table 5 is examined, it is seen that there is a significant difference between father's education level and students' LGS mathematics course achievement scores [F(4-412) = 11,73, p < 0.05]. According to the Scheffe test, which was conducted to determine which education levels this statistically significant difference belongs to, it was determined that the mathematics course achievement point average of the students whose fathers were university graduates was significantly higher than the average score of the students whose fathers were high school, secondary school, primary school and literate. Again, the mathematics course achievement mean scores of the students whose fathers are high school graduates are statistically significantly higher than the mean scores of the students whose fathers are primary school graduates and who are literate. However, it was found that the

mathematics course achievement average score of the students whose fathers were secondary school graduates was higher than the average score of the students whose fathers were primary school and literate, but this difference was not statistically significant.

Regarding the fourth question, the answer of which is sought in the research, the one-way ANOVA results, which were conducted to determine whether the mother's education level had a significant contribution to the mathematics course success of the students who took the LGS exam, are given in Table 6.

Table 6. The results of the students' mathematics course success average according to the education level of the mother

Education Level	n	$\overline{X}$	Sd
Literate	139	50,51	14,37
Primary School	133	52,19	14,72
Secondary School	79	54,15	14,40
High School	40	62,38	16,17
University	26	74,18	15,61
Total	417	54,35	15,89

When Table 6 is examined, the mean scores of students in LGS mathematics course according to the education level of the mother; Literacy ($\overline{x}$=50,51), primary school ($\overline{x}$= 52,19), secondary school ($\overline{x}$=54,15), high school ($\overline{x}$= 62,38) and university ($\overline{x}$=74,18) were found. According to these findings, it is seen that as the education level of the mother increases, the mathematics course exam success of the students also increases. In other words, there are differences between the education level of the mother and the mathematics course success average of the students. The results of the Scheffe test performed to test whether this difference is statistically significant are given in Table 7.

Table 7.ANOVA results of students' mathematics course achievement scores according to mother's education level

Source of Variance	Sum of Squares	Sd	Mean of Squares	F	P	Difference
Intergroup	15472,71	4	3868,18	17,79	,00	5 –1, 5-2
Withingroups	89561,81	412	217,38			5 - 3, 5-4
Total	105034,52	416				4 - 1, 4-2

1. Literate 2.Primary School 3.Secondary School 4.High School 5. University

When Table 7 is examined, it is seen that there is a significant difference between the mother's education level and the students' LGS mathematics course achievement scores [$F_{(4-412)}$ = 17,79, $p < 0.05$]. According to the Scheffe test, which was conducted to understand between which education levels this statistically significant difference is, it was determined

that the mathematics course achievement averages of the students whose mothers were university graduates were significantly higher than the averages of the students whose fathers were high school, secondary school, primary school and literate. Again, the mathematics course achievement mean scores of the students whose mothers are high school graduates are statistically significantly higher than the mean scores of the students whose mothers are primary school and literate. In addition, it was determined that the mathematics course achievement mean score of the students whose mothers were secondary school graduates was higher than the mean scores of the students whose mothers were primary school and literate, but this difference was not statistically significant. Regarding the answer to the fifth question of the research, the one-way ANOVA results applied to determine whether the monthly income level of the family has a significant contribution to the mathematics course success of the students who took the LGS exam are given in Table 8.

Table 8. The arithmetic mean and standard deviation results of the students' mathematics course achievement mean scores according to the monthly income level of the family

Income Level	n	$\overline{X}$	Sd
Low	145	48,20	13,78
Medium	126	54,31	14,73
High	146	60,49	16,52
Total	417	54,35	18,89

The monthly income level of the family was evaluated as Low (0 - 1500 TL), Medium (1500 - 2500 TL) and High (2500 TL and above).

When Table 8 is examined, according to the monthly income level of the family, the students' LGS mathematics course achievement score averages; It was found as Low ($\overline{x}$ =48,20), Medium ($\overline{x}$ = 54,31) and High ($\overline{x}$=60,49). According to these findings, it is seen that as the income level of the family increases, the mathematics course exam success of the students also increases. In other words, there are differences between the monthly income level of the family and the mathematics course success averages of the students. The results of the Scheffe test performed to determine whether this difference is statistically significant are given in Table 9.

Table 9. ANOVA results of students' mathematics course achievement scores according to the monthly income level of the family

Source of Variance	Sum of Squares	Sd	Mean of Squares	F	P	Difference
Intergroup	10989,38	2	5494,69	24,19	,00	3--2
Withingroups	94045,14	414	217,38			3--1
Total	105034,52	416				2 - 1

1. Low 2. Medium 3. High

When Table 9 is examined, it can be said that there is a significant difference between the monthly income level of the family and the students' LGS mathematics course achievement scores [$F_{(2-414)}$ = 24,19, p < 0.05]. According to the results of the Scheffe test, which was conducted to determine between which income levels this significant difference is, it was determined that the mathematics course achievement score average of the students with high monthly income in the family was significantly higher than the average score of the students whose family monthly income was medium and low. Again, it was determined that the mathematics course achievement score average of the students whose family's monthly income is at a medium level is significantly higher than the average score of the students whose family's monthly income is low.

Regarding the sixth question, the answer of which is sought in the research, the analysis results of whether there is a significant difference between the mathematics course achievements in the LGS exam according to the status of having a computer-internet at home are presented in Table 10.

Table 10. The t-test results of the mathematics course success average according to whether the students have computer-internet at home or not.

Computer-Internet	n	$\overline{X}$	Ss	Sd	t	p
Yes	190	56,92	15,70	415	3,06	,002
No	227	52,19	15,76			

According to Table 10, it has been determined that the students' mathematics course achievement mean scores show a significant difference according to whether there is a computer-internet at home. [$t_{(415)}$= 3.06 p < .05]. Mathematics course achievement mean score of the students who stated that there was a computer-internet in their homes ($\overline{x}$=56,92) and the mean scores of the students who stated that there was no computer-internet in their homes were found to be ($\overline{x}$=52,19). According to this result, it can be said that the presence of computers and internet in the houses of the students has a significant contribution to the mathematics course exam success scores of the students.

Discussion, Conclusion and Recommendations

In the study, it was determined that there was no significant difference between the mathematics course achievement mean scores of the students and the gender variable. This result of the research (Metin, 2013; Okutan & Daşdemir, 2018) is similar to the results of the studies conducted by them. However, it contradicts the results of the studies conducted by

(Aslan, 2017; Büyüköztürk & Denizkulu, 2002; Ellez, 2004). Again, according to the 2011 TIMSS eighth grade mathematics and science achievement results, it was seen that the mean score of female students in mathematics was higher than the average score of male students. However, according to the TIMSS 2015 national report, it was determined that the mean score of male students in mathematics was higher than the average score of female students, but this difference was not statistically significant. Similarly, according to the PISA 2015 national report, it was determined that the mean score of male students in mathematics achievement was higher than the average score of female students, but this difference was not statistically significant (MoNE, 2016). According to the PISA 2018 Turkey preliminary report, it has been determined that the rates of male and female students in mathematics proficiency levels are quite close to each other. The difference between the mathematics performance of male and female students between 2009 and 2018 in Turkey did not change significantly (MoNE, 2019). In the study conducted by Okutan and Daşdemir (2018), it was determined that there was no significant difference between the mathematics achievement scores of male and female students. However, in the study conducted by Türkan, Üner, and Alci (2015), it was determined that there was a statistically significant difference between the gender variable in mathematics course scores, and the success scores of male students in the mathematics test were higher than the scores of female students. Similarly, it was determined that the difference between the average scores of female and male students in the mathematics subtest in the 2018 LGS exam was significant, but this difference was at a very low level (MoNE, 2018). From this point of view, it can be said that there are different results between mathematics achievement and gender variable. There may be several reasons for this difference. As one of these, the fact that men and women are biologically and socially different may also have affected their mentality. It may be due to the fact that men are more dominant than women in almost every aspect of life all over the world. However, with the increase in the number of modern and democratic societies, the participation of both women and men in all areas of life will decrease the gender differences (Ellez, 2004). Another reason is that at younger ages, male students are ahead of female students in terms of mathematics achievement. It is shown that female students isolate themselves from job opportunities that require mathematical knowledge and do not make career plans for the future when they are young. However, as the education level increased, the gap in favor of boys and girls in terms of mathematics achievement began to close, especially since the 1990s. As a result of the

changes brought about by the industrialization of societies, women's efforts to gain more place in the business world have been cited as the reason for the closure of this gap (Meece, 1996; Cited by Dursun & Dede, 2004). Another reason may be the age of the sample group, as well as the differences in teacher and student characteristics (Delioğlu, 2017).

In the study, a statistically significant difference was found between the students' mathematics course achievement mean scores according to the school type. According to the results of the Scheffe test, which was conducted to determine between which school types this significant difference was, it was found that the mathematics course exam averages of private school students were significantly higher than the averages of both İmam Hatip secondary school and general secondary school students. As a reason for this situation; It is thought that the success of private school students is higher due to better educational opportunities, namely socio-economic reasons (Okutan & Daşdemir, 2018). This result of the research coincides with the result of the research conducted by Okutan and Daşdemir (2018). In the evaluation of the PISA 2015 national report, it was determined that the mathematics achievement of the students differed according to the school types. Again in this study, it was determined that the average of the mathematics course exam scores of the İmam Hatip secondary school students was higher than the average of the general secondary school students. While this result of the research contradicts the result of the study conducted by Okutan and Daşdemir (2018), it overlaps with the result of the study conducted by Sağlam and Tosun (2016). According to the PISA 2018 national evaluation report, the students studying at science high schools showed the highest achievement in mathematics among secondary education institutions, while the students studying at multi-program Anatolian high schools showed the lowest success. It has been determined that the average mathematics score of the students studying in Anatolian high schools is higher than the students studying in Imam Hatip Anatolian High Schools and Vocational and Technical Anatolian High Schools (MoNE, 2019). According to the report, in which the performance of the students who were placed through the 2018 High School Transition System (LGS) central exam were evaluated, it was determined that the exam score average of the students who graduated from private school was relatively higher than the average score of the students who graduated from other school types (MoNE, 2018).

In the study, it was determined that there was a significant difference between the students' LGS mathematics course achievement scores according to the education level of the

parents. According to the Scheffe test, which was conducted to determine between which education levels this significant difference was, it was determined that the mathematics course achievement score average of the students whose parents were university graduates was significantly higher than the average score of the students whose parents were high school, secondary school and literate. Again, it was concluded that the mathematics course achievement mean score of the students whose parents were high school graduates was significantly higher than the mean score of the students whose parents were primary school and literate. In addition, it was found that the mathematics course achievement mean score of the students whose parents were secondary school graduates was higher than the mean score of the students whose parents were primary school and literate, but this difference was not statistically significant. From this point of view, it is possible to say that as the education level of the parents increases, the mathematics course achievement scores of the students also increase. One reason for this situation may be that educated parents guide their children better and set a better example (Okutan & Daşdemir, 2018).This result of the research, (Anıl, 2009; Arı, 2007; Aslan, 2017; Kılıç et al., 2012; Metin, 2013; Okutan & Daşdemir, 2018) show similarities with the results of the studies. However, in the study conducted by Huyut and Keskin (2017), it was determined that students with low educational level of parents were more successful. This result contradicts with the result of the study. İpek (2011) stated that the SBS scores of the students differed statistically depending on the education level of the father, but did not differ statistically depending on the education level of the mother. Kılıç et al. (2012) stated that there is a relationship between success in mathematics and the cultural level of families. While the study by Hall et al. (1999) stated that the education level of the mother was more effective on the academic success of the student, the study by Keskin and Sezgin (2009) determined that the education level of the father was more effective on the academic success of the student. Anıl and Özer (2011) stated that there is a positive correlation between family characteristics and the education level of the father, and that this positive change in family characteristics positively affects students' academic success. Studies conducted by (Anıl, 2009; Taningco & Pachon, 2008; Turmo, 2004; cited by Anıl & Özer, 2011) also show that the education level of fathers and mothers has an important role in student success studies that make a contribution. In the study conducted by Özgen and Bindak (2011) they concluded that the educational status of the mother and father affects mathematics achievement. In the study conducted by Türkan, Üner, and Alci (2015), they

stated that the level of student achievement increases as the education of mothers increases. In the study conducted by Anıl (2011), it was stated that there is a positive relationship between the success of the students in science, as the education level of the parents increased. In the 2018 LGS evaluation report, it was determined that the average central exam scores increased significantly as the education levels of the parents increased (MoNE, 2018). It has been determined that families with a high level of education give more support to their children in their education and this support has a positive effect on the academic success of the students (Gooding, 2001).

In the study, it was determined that there was a significant difference between the students' LGS mathematics course achievement scores according to the income level of the family. According to the results of the Scheffe test, which was conducted to determine between which income levels this significant difference is, the mathematics course achievement average score of the students with a high monthly income, the monthly income of the family is significantly higher than the average of the students with medium and low income. It has been determined that the average score of mathematics course achievement of the students at the middle level is significantly higher than the average score of the students with a low monthly income. This may be due to the fact that those with high monthly income have better opportunities in terms of both social and physical conditions. These results of the research (Aslan, 2017; Huyut & Keskin, 2017; Kılıç et al, 2012; Okutan & Daşdemir, 2018) coincide with the results of the studies. Huyut and Keskin (2017) stated that the social-economic level has a positive effect on the success of the course. Similarly, Kılıç, Çene, and Demir (2012) found that children of families with high economic levels also have higher mathematics achievements, Metin (2013) found that there is a significant relationship between students' success in the placement test and the monthly income of the family, Aslan (2017), It was determined that the academic achievement of the students differed according to the income groups, the students in the upper income group were more successful than the middle and low income groups, and the students in the middle income group were more successful than the students in the low income group. Başol and Zabun (2014) stated that the economic status of the family is a highly effective variable in students' exam success. Kahveci (2009) stated that as the monthly total income of the family increases, the amount of expenditure per student arising from going to courses, private teaching institutions, study centers and taking private lessons increases, and there is a positive and significant

correlation between the monthly total income of the family and the private expenditure per student. Keskin and Sezgin (2009) provided that families who are in good shape economically have the opportunity to solve their problems in a timely manner because they are closely interested in their children's education problems. The ability of these families to provide all kinds of academic support to their children has made these children successful in school and lifelong learning. This may have had a positive effect on their children's academic success. Economic level is an important factor that affects students' self-confidence, self-esteem and development. It is observed that adolescents who grow up in families with high economic welfare are self-confident individuals with high self-esteem. This situation allows individuals with high economic level to be better in terms of academic success than students with low economic level (Cited in, Aslanargun, Bozkurt, & Sarıoğlu, 2016). Socio-economic level has both direct and indirect effects on students' academic achievement. The socioeconomic level, which has a direct effect on students' access to educational and academic resources, also indirectly affects the educational environments, social environments and many other factors (MoNE, 2018). Studies conducted by Caro (2009), Lamdin (1996) and White (1982) also determined that there is a statistically significant relationship between socioeconomic level and academic achievement of students.

Again, in the study, it was determined that the mathematics course success averages of the students showed a significant difference according to whether there was a computer at home or not. According to this, it can be said that students' having computer-internet has a significant contribution to students' mathematics course exam success scores. While this result of the research is consistent with the result of the study by Özer and Anıl (2011), it is not consistent with the result of the study conducted by Huyut and Keskin, 2017. Huyut and Keskin (2017) stated that there is a negative relationship between students' internet use while studying and their success. Özer and Anıl (2011) stated that students' having computers and computer equipment contributes positively to students' mathematics achievement. Similarly, in the study conducted by Türkan, Üner, and Alci (2015), it was stated that the participants who had a computer at home were more successful than the participants who did not have a computer, that the presence of a computer had a significant contribution to their mathematics achievement, and that the computer increased their success levels because it affected the cognitive processes of individuals. Ölçüoğlu and Çetin (2016) found that having and using a computer and internet at home is associated with higher student achievement. In

the TIMSS 2011 and TIMSS 2015 national evaluation report, it was stated that as the educational resources at home decreased, the mathematics achievement of the students decreased and the success of the students increased as the educational opportunities increased.

As a result: It was found that the mathematics course success scores of the students who took the high school entrance exam (HSEE-LGS) did not show a significant difference according to the gender variable, but there was a significant difference according to the type of school, the level of education of parents, the monthly income level of the family, and whether there is a computer-Internet at home. Based on the results of the research, some recommendations are presented.

Recommendations

1. In the study, it was determined that the LGS mathematics achievement score average of private school students was statistically significantly higher than other school types. The educational opportunities of private schools, the good level of factors such as family and teachers may have contributed to the success of mathematics. For this reason, schools, families and teachers should work in cooperation in order to develop positive attitudes towards mathematics and to improve school education opportunities for students studying in schools with low achievement levels.

2. In the study, it was determined that as the education level of the parents increased, the students' LGS mathematics course achievement average score also increased. It has been found that the education level of the family has a positive contribution to the mathematics achievement of the students. For this reason, it may be suggested by educators to organize parent-teacher association meetings or seminars at schools, and especially to families with low education levels, by emphasizing the importance of this significant difference, and to engage in activities to increase the education level of parents.

3. In the study, it was concluded that there is a significant difference between the monthly income level of the family and the students' LGS mathematics course achievement scores. In other words, it has been determined that there is a positive relationship between the success of the students and the income of the families. According to this result, necessary initiatives can be taken to provide assistance to the children of families with low income by the relevant units of the state.

4. In the study, it has been determined that the students who have computer and internet facilities at home have a significantly higher LGS mathematics course achievement average score. Families can be made aware that having communication tools such as computers and the internet at home is the most effective way to reach the desired information today.

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Author Contribution Statement

Cahit TAŞDEMİR: *Literature review, determination of the problem situation, determining the method, selection of the studies for the research, collecting data, analyzing data, creating conclusion and discussion sections, reporting, writing, auditing and editing processes.*

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