



[Research Article/ Araştırma Makalesi]

Investigation of Sociocultural and Socioeconomic Factors Affecting the Academic Achievement: PISA 2018 Turkey Sample

Akademik Başarıyı Etkileyen Sosyokültürel ve Sosyoekonomik Faktörlerin İncelenmesi: PISA 2018 Türkiye Örnekleme¹

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Keywords

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Abstract

Purpose: The purpose of the study is to investigate the socioeconomic and sociocultural factors that affect the success of the PISA 2018 Turkey sample in the fields of mathematical literacy, science literacy and reading skills in terms of the indexes created by PISA.

Methodology: The sample of the study consists of 6890 students. In PISA 2018, the average of ten plausible values created for each student was taken and student achievement scores were obtained. Stepwise Regression Analysis was applied to determine the extent to which the indexes predict student achievement.

Findings: The most predictive variables are Economic, Social and Cultural Status Index, occupational status of parents and Cultural Possessions Index. Information and Communication Technology Index negatively affects the achievement.

Highlights: Non-formal education should be used to increase the education level of students' parents. In order to reduce the inequality of opportunity for students whose families have a low socioeconomic level, the opportunities offered to schools in disadvantaged regions should be increased. Parents should be educated on the use of information and communication technology at home.

Öz

Çalışmanın amacı: PISA 2018 Türkiye örnekleminin matematik okuryazarlığı, fen okuryazarlığı ve okuma becerileri alanlarındaki başarısını etkileyen sosyoekonomik ve sosyokültürel faktörleri PISA tarafından oluşturulan endeksler açısından incelemektir.

Yöntem: Araştırmanın örneklemini 6890 öğrenci oluşturmaktadır. PISA uygulamasında her bir öğrenci için oluşturulan on olası değer ortalaması alınmış ve öğrenci başarı puanları elde edilmiştir. Endekslerin öğrenci başarısını yordama derecesinin tespit edilebilmesi için Aşamalı Regresyon Analizi uygulanmıştır.

Bulgular: Başarıyı en fazla yordayan değişkenler Ekonomik, Sosyal ve Kültürel Statü Endeksi, anne ve babanın mesleki statüsü ve Evdeki Kültürel Eşyalar Endeksidir. Bilgi ve İletişim Teknolojisi Endeksi başarıyı olumsuz etkilemektedir.

Önemli Vurgular: Öğrenci anne ve babasını eğitim seviyesinin yükseltilmesi için yaygın eğitimden yararlanılmalıdır. Ailesi düşük sosyoekonomik düzeye sahip olan öğrenciler açısından fırsat eşitsizliğinin azaltılması için dezavantajlı bölgelerdeki okullara sunulan imkanlar artırılmalıdır. Evde bilgi ve iletişim teknolojisi kullanımı konusunda ebeveynlere eğitim verilmelidir.

¹This paper is adapted from the master's thesis study carried out in Gaziosmanpaşa University Institute of Educational Sciences Department of Educational Administration and Supervision Master Program entitled "Investigation of Socio-cultural and Socioeconomic Factors Affecting the Academic Achievement of the PISA 2018 Turkey Sample"

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INTRODUCTION

Globalization means an increase in political, economic and cultural interactions between societies and the development of world citizenship awareness (Karabağ, 2006; cited in Çınar, 2009). It can be said that globalization has accelerated with the technological developments in the world and especially the widespread use of social media. One of the areas that globalization has affected the most is education. While it is important for countries to convey their own values to their students, it is also important for students to acquire the skills and universal values necessary for working with people from other cultures in the international arena.

It is important to measure the effectiveness of the education systems of the countries and their success in reaching the determined targets. It is important for countries to measure the success of their education systems, as well as to determine their place and success in the field of education among the countries they compete with. Thanks to these results, deficiencies and mistakes in education systems are seen and necessary precautions can be taken.

Determining the factors affecting success is as important as determining the level of success. It is possible to talk about many factors that affect success in education. These can be listed as individual factors (e.g. gender), school factors (e.g. school culture), and socioeconomic and sociocultural factors. In this study, the effect of socioeconomic and sociocultural factors on success was examined. Data from the Program for International Student Assessment (PISA) were used in this study, as it gives the opportunity to examine student achievement level and socioeconomic status together.

PISA is an international test administered by the Organization for Economic Cooperation and Development (OECD) in three-year terms since 2000. With the PISA exam, the reading skills of fifteen-year-old students and their ability to use their mathematics and science knowledge in real life are measured. With the application of PISA in a three-year period, countries can see the development of their education systems and how the relationship between success and the factors affecting the success has changed (Pokrobek, Borgonovi & McCormick, 2017).

In PISA, success is expressed with the concept of "literacy" (e.g. mathematical literacy, science literacy). "Literacy" refers to the use of knowledge and skills acquired at school in daily life (Kastberg, Chan & Murray, 2016). The fact that productive and effective participation in social life, which is one of the aims of compulsory education, can be measured by PISA increases the importance of the application (Özmuş, 2013).

PISA exams are held in two stages. In the first stage, the literacy levels (success scores) of the students are determined, and in the second stage, a questionnaire is applied. The socioeconomic status of the students is determined by the applied questionnaire. In the light of the data obtained, the factors affecting the success of the students can be examined.

The Relationship Between Academic Achievement and Socioeconomic/Sociocultural Factors

Socioeconomic status is defined as the position of the individual in society determined by the level of access to wealth, prestige and power (Willms, 1992; cited in Thien, 2016). There are many studies showing that there is a strong relationship between student achievement and the socioeconomic characteristics of the family. These studies show that students from low socioeconomic backgrounds are more likely to fail (Önder & Uyar, 2018).

Families with high socioeconomic status are more advantageous in providing their children with books, computers and opportunities to support their cognitive and affective development, such as hiring a private tutor to help with their lessons. Having a high level of culture in the family also supports children's vocabulary and building social networks (OECD, 2016a). Families with a high level of education are more willing to attach more importance to their children's education and to actively participate in their children's education processes. This is extremely important for children's cognitive, affective and academic development (Boonk, Gijsselaers, Ritzen, & Gruwel, 2018).

The high level of education in the family is not only a factor affecting the academic success of students. Families with a high level of education help their children to understand the cultural values of the society they live in and gain the ability to live in this culture. With the advantages of having a high education level, they support their children's academic success as well as their cultural development (Martins & Veiga, 2010).

In 1966, Coleman and Jencks conducted a large-scale study of 640,000 students in 4,000 schools in the United States. According to the Coleman Report, called the Equality of Educational Opportunity Survey, the characteristics of the students' family are more influential on students' achievement than the characteristics of the school. The characteristics of the school determine only 10.0-20.0% of student success (Karabay, 2013; Karasu, 2019).

Although the effect of the socioeconomic status of the family on success cannot be ignored, it is seen that the students can be successful despite their low socioeconomic and sociocultural status. According to PISA 2012 exam data, about one million students were successful despite their socio-cultural disadvantages. In the same application, 7.2% of the disadvantaged students in Turkey showed high success (Önder & Uyar, 2018). This situation is expressed as "academic resilience" in the literature (Böreççi and Gerçek, 2017). This situation is thought to be a subject that needs to be examined in depth in terms of educational inequality.

Since it is very difficult and often not possible to change the socio-economic characteristics of the student, the academic resistance of the student should be preserved and developed. Academic resistance can be achieved by reducing the risk factors that cause failure and developing protective factors (Krovetz, 1999; cited in Önder and Uyar, 2018).

Students with low socioeconomic status are provided with much more limited resources by their families throughout their education life. As a result of this situation, the student fails academically. Due to low academic achievement, these students cannot continue their education in good schools in the future and work in low-status and low-paid jobs. Since his own family has a low socioeconomic level, he cannot provide adequate social, cultural and educational support to his own children, and these children also have low academic success. As can be seen, this situation is passed on through generations in the family.

The degree to which student success is affected by variables such as socioeconomic status, school factors, and gender, which cannot be changed by the student, reflects the inequality in the education system. The high degree of impact of socioeconomic factors on academic achievement reveals the gap between students with different socioeconomic status (Liu, Peng, & Luo, 2020). In other words, if socioeconomic and sociocultural factors are very effective on academic achievement in an education system, it can be said that education inequality is high in that system. Determining the relationship between success and the factors affecting success is considered important in terms of closing the success gap and ensuring equality (Long & Pang, 2016).

METHOD

Correlation type relational screening model was used in the research, since the relationship between the achievement scores and the socioeconomic characteristics of the PISA 2018 Turkey sample was examined. In the correlation type screening model, the level of change is tried to be determined (Karasar, 2019).

Population and Sample

The population of the research is students in the age group of 15 in Turkey. The sample consists of 6890 students who participated in the PISA 2018 exam in Turkey. 6890 students in 186 schools selected from 12 regions of Turkey participated in the PISA 2018 application. The information about the students in the sample is shown in the table below.

Table 1. PISA 2018 Turkey Sample

Student Characteristics	Categories	f	%
Gender	Male	3.494	50,4
	Female	3.396	49,6
School Type	Anatolian H.S	3.013	43,7
	Voc. and Tech. Anatolian H.S	2.143	31,1
	Anatolian Imam Hatip H.S	943	13,7
	Science H.S	226	4,2
	Multi-Program Anatolian H.S	273	4,0
	Social Sciences H.S	228	2,4
	Anatolian Fine Arts H.S	42	0,6
	Secondary School	22	0,3
Total		6.890	100

Of the students participating in the PISA 2018 exam in Turkey, 43.7% Anatolian High School, 31.1% Vocational and Technical Anatolian High School, 13.7% Anatolian Imam Hatip High School, 4.2% Science High School, % 4.0% of them are Multi-Program Anatolian High School, 2.4% of them are Social Sciences High School, 0.6% of them are Anatolian Fine Arts High School and 0.3% of them are secondary school students. While 49.6% of the sample consists of female students, 50.4% is male students (MEB, 2019).

Data Collection and Analysis

In the study, the PISA 2018 database, which is made available on the internet by the OECD, was used. In the PISA exam, the students answered the reading skills, mathematics and science literacy tests and the questionnaires revealing their demographic characteristics, socioeconomic and sociocultural status. In the study, the answers given by the students to the tests and questionnaires were used.

The data obtained through the OECD were analyzed with the SPSS 20 program. In the PISA 2018 dataset, instead of showing the success of the students with a single score, ten plausible values were created for each measurement area. The analyzes in the research were made by taking the average of these values.

In the analysis, the hypothesis of normal distribution was examined according to skewness and kurtosis values and sample size. For the normal distribution, histogram graphs were also used. In order to examine the linearity and normality assumptions, Mahalanobis, Cook's and Leverage values of the variables were examined and extreme values that made it difficult to meet the assumption were excluded from the analysis. The skewness and kurtosis values of the score types taken as the dependent variable in the study are shown in Table 2.

Table 2. Skewness and Kurtosis Values of Score Types

Score Types	Skewness	Kurtosis
Reading Skills	-.018	-.408
Math Literacy	.236	-.202
Science Literacy	.115	-.376

As Table 2 is examined, it is understood that the skewness and kurtosis values of all three score types are between +1.5 and -1.5. Therefore, skewness and kurtosis values are within acceptable limits, and the distribution is seen to be normal. The skewness and kurtosis values of the indexes created by PISA are shown in Table 3.

Table 3. Skewness and Kurtosis Values of the Indexes

Indexes	Skewness	Kurtosis
Economic, Social and Cultural Status Index (ESCS)	.21	-.68
Home ICT Index (ICTHOME)	-.21	-.39
Cultural Possessions Index (CULTPOSS)	.31	-.15
Home Educational Resources Index (HEDRES)	-.04	-.09
Family Wealth Index (WEALTH)	.14	1.42

As Table 3 is examined, it is seen that the kurtosis and skewness values of all indexes are between +1.5 and -1.5 and the normal distribution variance is seen.

Economic, Social and Cultural Status Index (ESCS), Home Information and Communication Technology Index (ICTHOME), Cultural Possessions Index (CULTPOSS), Home Educational Resources Index (HEDRES), Family Wealth Index (WEALTH), Mother's Occupational Status Index (MOCS) and Father's Occupational Status Index (FOCS) are included in the Stepwise Regression Analysis.

In the study, in addition to normal distribution estimates, it is also examined whether there is a multicollineity between independent variables. Multicollinearity is a high level of correlation between independent variables (Büyükoztürk, 2012). The correlation between independent variables is shown in Table 4.

Table 4. Correlation Between Independent Variables

	1	2	3	4	5	6	7
ICTHOME (1)	1						
CULTPOSS (2)	.382	1					
HEDRES (3)	.534	.453	1				
WEALTH (4)	.662	.482	.612	1			
ESCS (5)	.502	.517	.557	.706	1		
MOCS (6)	.217	.309	.246	.355	.583	1	
FOCS (7)	.254	.281	.289	.382	.722	.432	1

As Table 4 is examined, it is seen that the correlation between independent variables is below .80 and there is no multicollinearity.

The data is also examined in terms of extreme values. The error statistics table is examined and it is determined that the Std.Residual values are in the range of -3.29/+3.29 for each dependent variable and the Cook's Distance value is below 1. It is

observed that Variance Inflation Factor (VIF) values are below 2. When the findings are evaluated collectively, it is concluded that there is no multicollinearity.

The Economic, Social and Cultural Status Index was created using the information on the highest education level of the student's parents, the highest professional status, the possessions they own at home, and the number of books they own at home. Information on which data were used to create the other indexes included in the study is shown in Table 5.

Table 5. Variables That Make Up the Indexes (OECD, 2018)

Item	Description	WEALTH	CULTPOSS	HEDRES	ICTHOME
ST011Q01TA	A desk to study at			•	
ST011Q02TA	A room of your own	•			
ST011Q03TA	A quiet place to study			•	
ST011Q04TA	A computer			•	
ST011Q05TA	Educational software			•	•
ST011Q06TA	A link to the Internet	•			•
ST011Q07TA	Classic literature		•		
ST011Q08TA	Books of poetry		•		
ST011Q09TA	Works of art		•		
ST011Q10TA	Books to help with your school work			•	
ST011Q11TA	Technical reference books			•	
ST011Q12TA	A dictionary			•	
ST011Q16NA	Books on art		•		
ST011D17TA	Air conditioner (Turkey)	•			
ST011D18TA	A holiday (Turkey)	•			
ST011D19TA	TV subscriptions with payment (Turkey)	•			
ST012Q01TA	Television (number)	•			
ST012Q02TA	Car (number)	•			
ST012Q03TA	Rooms with a bath or shower (number)	•			
ST012Q05NA	Cell-phones with Int. access (number)	•			•
ST012Q06NA	Computer (number)	•			•
ST012Q07NA	Tablet computer (number)	•			•
ST012Q08NA	E-book reader (number)	•			•
ST012Q09NA	Musical instrument (number)		•		
ST013Q01TA	The number of books at home				

FINDINGS

Stepwise Regression Analysis was applied to determine to what extent the indexes predicted students' achievement scores in reading skills, mathematical literacy and science literacy. The results of the Stepwise Regression Analysis applied to determine which variables predict students' reading skills scores are shown in Table 6.

Table 6. Stepwise Regression Analysis of Which Variables Predicted the Reading Skills

Model	Predictor	B	SH _B	β	ΔR ²	t
1	ESCS	26.728	.892	.374	.140	29.949**
	Fixed	498.203	1.473			
2	ESCS	19.761	1.084	.276	.019	18.231**
	MOCS	.752	.068	.168		
	Fixed	471.646	2.787			
3	ESCS	13.353	1.406	.187	.008	9.497**
	MOCS	.740	.068	.165		
	FOCS	.488	.069	.126		
	Fixed	447.184	4.420			
4	ESCS	8.220	1.547	.115	.009	5.134**
	MOCS	.731	.067	.163		
	FOCS	.567	.069	.147		

Model	Predictor	B	SH _B	β	ΔR ²	t
	CULTPOSS	8.050	1.037	.112		7.762**
	Fixed	444.832	4.407			
5	ESCS	11.868	1.676	.166	.005	7.080**
	MOCS	.689	.067	.154		10.218**
	FOCS	.509	.070	.132		7.308**
	CULTPOSS	8.904	1.046	.124		8.515**
	ICTHOME	-2.620	.471	-.081		-5.565**
	Fixed	469.182	6.201			
6	ESCS	4.790	1.889	.067	.009	2.535*
	MOCS	.715	.067	.160		10.646**
	FOCS	.606	.070	.157		8.621**
	CULTPOSS	8.008	1.046	.112		7.658**
	ICTHOME	-4.652	.533	-.144		-8.724**
	WEALTH	14.849	1.866	.163		7.958**
	Fixed	488.924	6.647			
7	ESCS	2.728	1.921	.038	.004	1.420*
	MOCS	.744	.067	.166		11.070**
	FOCS	.639	.070	.165		9.080**
	CULTPOSS	7.056	1.057	.098		6.675**
	ICTHOME	-5.253	.543	-.163		-9.677**
	WEALTH	12.891	1.894	.142		6.805**
	HEDRES	7.344	1.326	.091		5.537**
	Fixed	488.483	6.630			

*p<.05 **p<.01 Note: N=6.890, At the first stage R²=.14, p=.00; Differentiation in R² at the second stage=.019, p=.00; Differentiation in R² at the third stage=.008, p=.00; Differentiation in R² at the fourth stage=.009, p=.00; Differentiation in R² at the fifth stage=.005, p=.00; Differentiation in R² at the sixth stage=.009, p=.00, p=.011 (ESCS); Differentiation in R² at the seventh stage=.004, p=.00, p=.156 (ESCS). Total R²=.194.

The analysis was completed in seven stages. In the first stage, the Economic, Social and Cultural Status Index variable, which explains the variance the most with 14%, entered the analysis. There is a positive relationship between the reading skills score and the ESKSE. As the students' ESKSE scores increase, their reading skills scores increase.

In the second stage, MOCS variable, which contributed 1.9% to the analysis, was entered and the variance increased to 15.9%. As the mother's occupational status score increases, the student's reading skills score also increases. In the third phase, FOCS was included in the analysis. The contribution of the FOCS variable to the variance is 0.8%. Thus, the variance increased to 16.7%. As the father's occupational status score increases, the student's reading skills score increases.

In the fourth stage, the CULTPOSS variable was included and contributed 0.9% to the variance. The total variance increased to 17.6%. As the student's cultural possessions index score increases, the reading skills score also increases. In the fifth stage, the ICTHOME variable, which contributed 0.5% to the variance, was included and the variance increased to 18.1%. There is a negative relationship between ICTHOME and reading skills scores.

In the sixth stage, the WEALTH variable was included in the analysis and increased the total variance with 0.9% contribution to 19.0%. As the WEALTH index score increases, the student achievement score also increases. In the seventh and final stage, the HEDRES index was included in the analysis. The contribution of the HEDRES index to the variance is 0.4%. Thus, the total variance was determined as 19.4%. As the educational resources index score increases, the student achievement score increases. The results of the Stepwise Regression Analysis performed to determine which variables predict students' mathematical literacy scores are shown in Table 7.

Table 7. Stepwise Regression Analysis of Which Variables Predicted the Math Literacy

Model	Predictor	B	SH _B	β	ΔR ²	t
1	ESCS	26.169	.863	.378	.143	30.321**
	Fixed	485.764	1.390			
2	ESCS	16.242	1.046	.278	.020	18.400**
	MOCS	.751	.066	.173		11.450**
	Fixed	459.294	2.689			
3	ESCS	12.229	1.357	.177	.010	9.010**
	MOCS	.736	.065	.170		11.288**

Model	Predictor	B	SH _B	β	ΔR ²	t
	FOCS	.533	.066	.143		8.040**
	Fixed	432.570	4.266			
4	ESCS	6.995	1.579	.101	.006	4.430**
	MOCS	.782	.065	.180		11.955**
	FOCS	.615	.067	.165		9.140**
	HEDRES	7.570	1.179	.097		6.421**
	Fixed	426.035	4.371			
5	ESCS	10.100	1.645	.146	.006	6.140**
	MOCS	.749	.065	.173		11.472**
	FOCS	.563	.067	.151		8.349**
	HEDRES	10.276	1.247	.131		8.241**
	ICTHOME	-3.091	.478	-.099		-6.467**
	Fixed	452.814	6.009			
6	ESCS	7.741	1.697	.112	.004	4.562**
	MOCS	.732	.065	.169		11.220**
	FOCS	.600	.068	.161		8.873**
	HEDRES	9.041	1.264	.115		7.152**
	ICTHOME	-3.306	.478	-.106		-6.911**
	CULTPOSS	5.585	1.023	.080		5.458**
	Fixed	454.272	5.999			
7	ESCS	4.421	1.863	.064	.003	2.373*
	MOCS	.741	.065	.171		11.379**
	FOCS	.645	.068	.173		9.439**
	HEDRES	8.010	1.285	.102		6.234**
	ICTHOME	-4.270	.528	-.137		-8.086**
	CULTPOSS	5.266	1.024	.076		5.141**
	WEALTH	7.896	1.845	.089		4.280**
	Fixed	464.538	6.452			

*p<.05 **p<.01 Note: N=6.890, At the first stage R²=.143, p=.00; Differentiation in R² at the second stage=.020, p=.00; Differentiation in R² at the third stage=.010, p=.00; Differentiation in R² at the fourth stage=.006, p=.00; Differentiation in R² at the fifth stage=.006, p=.00; Differentiation in R² at the sixth stage=.004, p=.00; Differentiation in R² at the seventh stage=.004, p=.00, p=.018 (ESCS). Total R²=.192.

The analysis was completed in seven stages. In the first stage, the ESCS variable, which explains the most variance with 14.3%, entered the analysis. There is a positive relationship between ESCS score and mathematical literacy score. As the students' ESCS scores increase, their mathematics scores also increase.

MOCS variable was added to the analysis with 2.0% contribution to the variance in the second stage. The explained variance increased to 16.3%. In the third stage, the FOCS variable was included in the analysis with 1.0% and the total variance increased to 17.3%. There is a positive relationship between the occupational status score of the mother and the father and the student's mathematical literacy scores.

In the fourth stage, the variable HEDRES was included in the analysis. The contribution of the variable to the variance is 0.6%. In the fifth stage, the ICTHOME variable, which contributed 0.6% to the variance, was included and the total variance increased to 18.5%. While there is a positive relationship between the HEDRES Index and the student's mathematical literacy, there is a negative relationship between the ICTHOME Index and mathematical literacy. As the ICTHOME Index score increases, the mathematical literacy score decreases.

In the sixth stage, the CULTPOSS Index, which contributed 0.4% to the variance, and in the seventh stage WEALTH Index were included in the analysis. There is a positive correlation between CULTPOSS and WEALTH indexes and mathematical literacy scores. Thus, the total variance was determined as 19.2%. The results of the Stepwise Regression Analysis performed to determine which variables predict students' science literacy scores are shown in Table 8.

Table 8. Stepwise Regression Analysis of Which Variables Predicted the Science Literacy

Model	Predictor	B	SH _B	β	ΔR ²	t
1	ESCS	24.922	.832	.374	.140**	29.953**
	Fixed	498.649	1.340			
2	ESCS	18.172	1.008	.273	.020**	18.029**

Model	Predictor	B	SH _B	β	ΔR ²	t
	MOCS	.732	.063	.175		11.577**
	Fixed	472.854	2.592			
3	ESCS	11.874	1.309	.178	.008**	9.070**
	MOCS	.719	.063	.172		11.423**
	FOCS	.478	.064	.133		7.486**
	Fixed	448.855	4.115			
4	ESCS	6.519	1.522	.098	.007**	4.282**
	MOCS	.765	.063	.183		12.137**
	FOCS	.562	.065	.156		8.672**
	HEDRES	7.744	1.137	.103		6.813**
	Fixed	442.170	4.214			
5	ESCS	9.231	1.587	.139	.005**	5.817**
	MOCS	.737	.063	.176		11.692**
	FOCS	.517	.065	.144		7.949**
	HEDRES	10.107	1.203	.134		8.402**
	ICTHOME	-2.699	.461	-.090		-5.853**
	Fixed	465.552	5.797			
6	ESCS	6.867	1.636	.103	.005**	4.196**
	MOCS	.719	.063	.172		11.432**
	FOCS	.554	.065	.154		8.496**
	HEDRES	8.869	1.219	.118		7.274**
	ICTHOME	-2.914	.461	-.097		-6.316**
	CULTPOSS	5.594	.987	.084		5.669**
	Fixed	467.012	5.787			
7	ESCS	3.465	1.797	.052	.003**	1.929*
	MOCS	.729	.063	.175		11.603**
	FOCS	.600	.066	.167		9.109**
	HEDRES	7.813	1.239	.104		6.305**
	ICTHOME	-3.902	.509	-.130		-7.663**
	CULTPOSS	5.268	.988	.079		5.333**
	WEALTH	8.093	1.779	.095		4.549**
	Fixed	477.536	6.222			

*p<.05 **p<.01 Note: N=6.890, At the first stage R²=.140, p=.00; Differentiation in R² at the second stage=.020, p=.00; Differentiation in R² at the third stage=.008, p=.00; Differentiation in R² at the fourth stage= .007, p=.00; Differentiation in R² at the fifth stage=.005, p=.00; Differentiation in R² at the sixth stage=.005, p=.00; Differentiation in R² at the seventh stage=.003, p=.00, p=.05(ESCS). Total R²=.188

The analysis was completed in seven stages. In the first stage, the ESCS variable was included in the analysis with an effect of 14.0%. There is a positive correlation between ESCS and science literacy scores. As the students' ESCS scores increase, their science literacy scores also increase. In the second stage, MOCS with 2.0% contribution and FOCS with 0.8% contribution in the third stage were included and the total variance increased to 16.8%.

HEDRES variable with 0.7% contribution in the fourth stage, ICTHOME variable with 0.5% contribution in the fifth stage were included in the analysis and the total variance increased to 18.0%. While science scores have a positive relationship with the HEDRES variable, there is a negative relationship between science scores and ICTHOME. As the students' ICTHOME scores increase, their science literacy scores decrease.

In the sixth stage, CULTPOSS Index with a contribution of 0.5%, and in the seventh and last stage, the WEALTH Index with a contribution of 0.3% were included in the analysis. As the students' CULTPOSS and WEALTH scores increase, their science literacy scores also increase. Thus, the total effect of the indexes on the science literacy score increased to 18.8%.

DISCUSSION

It was determined that the most predictive variable for reading skills, mathematical literacy and science literacy scores was the Economic, Social and Cultural Status Index. This index was created based on the variables of the highest education level of the student's parents, the highest occupational status, household possessions and the number of books in the house. Therefore, it is possible to say that all these socioeconomic factors have important contributions to student success in all three areas. There are many studies in the domestic and foreign literature showing the effect of socioeconomic factors on student achievement (Alacacı & Erbaş, 2010; Altun, 2007; Aslan, 2017; Ateş & Karadağ, 2017; Berberoğlu & Çelebi, 2003; Bouhlila, 2017;

Boztunç, 2010; Chiu & McBride Chang, 2006; Chiu & Xihua, 2008; Demir, Kılıç & Ünal, 2010; Dinçer & Kolaşın, 2009; Kalaycıoğlu, 2015; Kotte, Lietz & Lopez, 2005; NCES, 2001; Oral & McGivney, 2014; Özdemir & Gelbal, 2014; Sarier, 2010; Sarier, 2016; Sun & Bradley, 2011; Şirin, 2005; Usta, 2014; Yıldırım, 2012).

After ESCS, the variables that predict student success the most are the occupational status of student parents. The occupational status of the mother is more predictive for all three domains than the occupational status of the father. Numerous studies reveal that the professional status of students' parents is important for success (Akyüz & Pala, 2010; Çeçen, 2015; Dinçer & Kolaşın, 2009; Giambona & Porcu, 2015; Hazır Bıkmaz, 2001; Turkan & Alici, 2015; Usta, 2014; Zasacka & Bulkowski, 2017).

The index that predicts reading skills scores the most after ESCS and the indexes showing the occupational status of the parents is the index of cultural possessions at home. Considering that the CULTPOSS Index is created based on the literary works, poetry books, works of art, books written on art and the number of musical instruments at home, it can be said that these variables are important for the success of the students in the field of reading skills.

It was determined that the WEALTH Index is significant but not as effective as other indexes. There are studies that concluded that the financial wealth of the family is effective on success (Carnerio & Heckman, 2003; Giambona & Porcu, 2015; Hazır Bıkmaz, 2001). Turmo (2004) found that the cultural richness of the family has a greater effect on student achievement than family wealth. At the same time, there are studies that found that the occupational status and education level of the family have a greater effect on success than financial wealth (Xie & Ma, 2019) and that financial wealth is not a significant predictor of success (Dadandı, Dadandı & Koca, 2018).

ICTHOME is a variable that negatively affects success for all three measurement areas. The ICTHOME Index was created on the basis of the number of information and communication technology tools at home, not the availability of these tools. It can be said that the negative effect on student achievement scores is related to this. Therefore, as the number of technological tools increases, student success is negatively affected in reading skills, mathematical literacy and science literacy.

CONCLUSION AND RECOMMENDATIONS

Socioeconomic and sociocultural factors such as the education level of the student's parents, occupational status, household possessions and books owned at home are the ones that most affect success in reading skills, mathematical literacy and science literacy. It was found that the occupational status of the mother is more important than the occupational status of the father in terms of student achievement. The number of literary works, poetry books, works of art, books written on art and the number of musical instruments at home are among the factors that predict success the most. While having a computer and internet connection at home affects success positively, student success decreases as the number of these information and communication technology tools increases. It was determined that educational resources such as a desk at home, a quiet place to study, computers, supplementary textbooks, technical reference books and dictionaries are the factors that predict mathematics and science achievement the most. It was concluded that the financial wealth of the family is significant for the measurement areas, but its effect is not as high as the other factors. But financial wealth should not be considered independently of other variables. The socioeconomic status of the family and the opportunities provided to the students at home are related to financial wealth.

Education level of parents affects student achievement. It should be ensured that the parents of students with low education levels benefit from non-formal education and develop their thoughts on the importance of education. Considering that children who are currently students will become parents in the future, preventive measures should be taken in terms of school attendance and academic failure. Thus, the negative effect of parental education level, which is an important factor for student success, will be reduced.

In order to minimize the inequality of opportunity between students from low and high socioeconomic levels, the opportunities offered to schools where disadvantaged students receive education should be increased. In these schools, computer, internet and library facilities that students can use effectively should be provided, and more time and financial resources should be allocated for extracurricular activities. Free tickets and checks should be provided, and cultural trips should be encouraged so that students who are financially incapable can benefit from activities such as bookstores, cinemas and theaters. Schools should be transformed into places where students can see and create works of art. Parents should be trained on the efficient and safe use of information and communication technology.

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Statements of publication ethics

We hereby declare that the study has not unethical issues and that research and publication ethics have been observed carefully.

Researchers' contribution rate

The study was conducted and reported with equal collaboration of the researchers.

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