RETHINKING THE ACADEMIC ACHIEVEMENT (FAILURE) OF VOCATIONAL HIGH SCHOOL STUDENTS: STUDENT (FAMILY) OR SCHOOL, WHAT IS DECISIVE?

(Research article)

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Abstract

The purpose of this study is to analyze the academic achievement of vocational high school students through student level and school level variables. Student level variables were demographic data, socioeconomic and socio-cultural characteristics of the family, the educational environment and opportunities provided to the student, as well as attitude scores determined by the Attitude towards School Scale. School level variables were the total number of students and teachers in the schools. Hierarchical Linear Model (HLM) was used to analyze student and school level variables. Vocational high school students come mainly from the lower socioeconomic strata of society. Academic achievements of students differ according to schools. The school level variable that predicts academic achievement is the total student number in the school. The more the number increases, the academic achievement of the students decreases. Variables that determine academic achievement in vocational education is predominantly (63% probability) related to socioeconomic and socio-cultural variables at the student level.

Keywords: Academic achievement, vocational high school, HLM, secondary education, Turkey

1. Introduction

There is almost a social consensus regarding the low academic achievement of vocational high school students in Turkey. All parties of this social consensus, especially the politicians or bureaucrats who direct the education system, generally mention the negativity of the social perception of these high schools as a priori regarding the reasons for the academic failure of vocational high school students; however, they do not provide sufficient analytical data (Ministry of National Education [MoNE], 2018a; 2018b). A few studies on the subject draw attention to some out-of-school or systemic variables (Aedo, Naqvi, & Cahu, 2013; Education Reform Initiative [ERG], 2009; 2012; Oral & Mcgivney, 2014; Turkish Education Association [TED, 2010]). The situation of vocational high schools in Turkey is becoming increasingly familiar; the demand for these high schools is doomed to mandatory placements based on address. Thus, vocational high schools turn into a type in which students who have not settled in any of their preferences are in the majority. This situation presents an oxymoron appearance. On the one hand, it is emphasized that vocational education is very important, on the other hand, it is difficult to find students for these high schools; families do not send their children

to these schools unless they have to. Thus, children who do not get enough points in the high school transition exam are necessarily clustered in these high schools. So why do the most "unsuccessful" children cluster in angel high schools? Are there any common characteristics that define these children? Is this clustering a result of children's low ability and effort; or does it indicate a systemic disintegration?

Academic achievement is one of the important quantitative indicators used to evaluate the efficiency of education systems. Countries, regardless of their type and level, make an effort to increase academic success in the education system. In fact, in determining the national level of academic achievement, it is seen that central exams that allow international comparisons have increased and countries have reorganized their education systems and policies depending on the results of these exams. Of course, this is a meaningful effort for countries. Because every country wants the children to whom it will entrust its future to be more successful and desires to develop the human potential in the best way. At the same time, the way to be ahead in international competition and to increase national welfare is to train high-qualified manpower within the framework of a developmental paradigm (Âdem, 1993, 2008; Hesapçıoğlu, 1984, 1994; Karakütük, 2012; Kavak, 1990; Serin, 1979). Raising high-qualified manpower has a cost for every country. Therefore, countries also strive for efficient and effective functioning of their education systems.

Various methods used in the evaluation of the efficiency of the education system are mentioned in the education economics literature. One of them is the internal productivity rate, which allows the evaluation of the internal functioning of the system, and the other is the external productivity rate, which evaluates the suitability of the grown manpower for economic and social life (Âdem, 1993; Bülbül, 1988; Hesapçıoğlu, 1994; Serin, 1979; Ünal, 1996). The internal productivity ratio, calculated based on students' academic achievement, is a quantitative indicator of a student's progress in the education system. With internal efficiency indicators; it is possible to determine the classes, levels, and types of education where the efficiency has decreased, and even the classes with low academic success and the classes or levels with a high probability of dropout and dropout are possible. Therefore, any policy to increase academic achievement or reduce dropout directly means increasing the internal efficiency of the system. The external efficiency of the education system is related to the conformity of the educational qualifications gained through education to the society (Bülbül, 1988; Ünal, 1996). Calculating the internal efficiency of a system and evaluating its external efficiency provide important data in terms of education policies and planning studies. However, it is necessary to know the variables that affect the academic achievement of students in order to increase the internal efficiency of the system and to develop policies at macro and micro level regarding external efficiency. For this reason, academic achievement is not only an indicator of the results of individuals' efforts for countries. When considered from a technocratic point of view, it is also an indicator of whether the resources allocated to education are used efficiently and effectively and that the outputs of the education system are suitable for the society.

In the literature, the variables that affect the academic success of students seem to be numerous, complex and intertwined. It is seen that in studies centered on variables originating from students, academic achievement differences are mostly tried to be explained by differences in children. In such studies, gender (Demir, Kılıç & Ünal, 2010; Halpern, 2007; Keskin & Sezgin, 2009; Kılıç & Karadeniz, 2004), intelligence and talent (Yıldırım, 2000), willingness (Zasacka & Bulkowski, 2017), study habits (Smith & Niemi, 2001), self-efficacy and motivation level (Doğru & Ünlü, 2012; Sarıer, 2016; Pajares, 1996), personality traits (Sığrı & Gürbüz, 2011), communication styles with friends, teachers or parents (Harding, 2003; Huang, 2008; Yılmaz, 2000), anxiety levels in the face of any lesson or exam (Akın, 2008;

Austin & Partridge, 1985; Benjamin, 1991; Birenbaum & Nasser, 1994; Cassady, 2004; Culler & Holahan, 1980; Hancock, 2001) and academic achievement are tried to be explained. In the literature, it is seen that studies to make sense of academic success through such individual variables are dominant and success is generally considered as an individual result depending on the child's interest, ability, effort and/or psychological state. There is a lack of connection between academic achievement and the education system in which the child is or more generally the political and economic system can be seen as a kind of limitation in these studies. However, in the studies conducted in recent years, it has begun to be determined in the national literature that it is insufficient to explain the academic achievement of students only with their individual characteristics (Aslan, 2017; Bozkurt et al., 2021; Bülbül, 2021; Dinçer & Kolaşin, 2009; Fındık & Kavak, 2013; Köse, 2007; Ünal et al., 2010).

On the other hand, there are also studies that directly or indirectly associate school variables or institutional variables with academic success. An important part of the research in this group is about improving the environment and facilities of schools or reducing inequalities between schools. It is stated that these studies bring suggestions for making the education system more effective over school variables or for the education system at the institutional level; it is seen that they focus on access to education and equality of opportunity and opportunity in education (Aslan, 2015; Dinçer & Kolaşin, 2009; ERG, 2009; Oral & Mcgivney, 2014; Yolcu & Kurul, 2009). Therefore, it is possible to consider them as academic achievement studies. Because every regulation and improvement related to the school directly or indirectly contributes to the better realization of the school's goals and to the increase of academic success. The most important contribution of equality of opportunity in education or effective school research to the academic achievement literature is the findings that institutional variables related to school are more important than individual variables in the success of the child, especially in developing countries (Balcı, 2014; Heyneman & Loxley, 1983). Today, school development studies, which mainly focus on institutional variables, have been added to these studies. While the initial studies that deal with academic achievement in the context of school variables focus on the infrastructure opportunities of schools (Lei & Zhao, 2007), today, school improvement research has diversified; In addition to the infrastructure facilities of the school, self or collective teacher competencies (Bandura, 1993; Shahzad & Naureen, 2017), school culture (Bozkurt et al., 2021; Şahin, 2011), climate (Chen & Weikart, 2008), size (Aksu, Güzeller & Eser, 2017; Erdoğan & Acar Güvendir, 2019), the leadership characteristics of teachers and school administrators (Bozkurt et al., 2021; Fink & Resnick, 2001; Özdemir, 2019) or the leadership capacity of the school (Aslan, 2020) is seen to expand to topics such as. However, it is seen that studies on how educational policies or institutional arrangements regarding the education system affect the academic success of students are insufficient in the national literature and analytical studies are needed on this subject.

Within this wide spectrum of variables affecting academic success, Coleman's emphasis on socioeconomic variables through family history in the 1960s caused a new dimension to enter the literature. Coleman (1988) found that a child's family background is more crucial for academic achievement than individual characteristics. This finding constitutes a dimension frequently emphasized by thinkers who draw attention to the reproduction function of education. The most emphasized variable by researchers who draw attention to the reproductive function of education is the child's family background or social class. According to this point of view, the education system performs the elimination function by distributing individuals from various socioeconomic levels and social classes to the appropriate education types and levels for the social classes they come from. He does this through his diplomas. Thus, the education system reproduces the existing class structure (Althusser, 2006; Apple, 2004, 2006; Aslan, 2017; Bourdieu & Passeron, 2018; 2019; Bowles & Gintis, 2002) and distributes

children to occupations similar to their parents' occupations. In this process, the education system screens individuals not according to their natural abilities, but according to their abilities that can be developed later, and provides the distribution of individuals to certain organizational positions with the diplomas it gives (Ünal, 1996, 2005). As a matter of fact, Bourdieu and Passeron (2018; 2019) state that the academic success of the child is the product of the social class they come from rather than being the product of their abilities. He argues that individuals with strong cultural capital are more fortunate in schools. Because the school transmits the culture of the social upper class to a large extent; therefore, individuals who are prone to this culture are more likely to be successful. Moreover, individuals with strong cultural capital are also likely to have strong economic capital. Especially in academic success; It is seen that studies dealing with socio-cultural and socioeconomic variables reveal findings consistent with the arguments of Bourdieu and Passeron or Coleman (Giambona & Porcu, 2015; Kalaycıoğlu, 2015; Kotte, Lietz & Lopez, 2005; Liu, Peng & Luo, 2020; Long & Pang, 2016; Organization for Economic Co-operation and Development [OECD], 2010; Parcel & Dufur, 2001; Schiller, Khmelko & Wang, 2002; Sirin, 2005).

All of these individual, institutional and social variables that affect academic success are also valid for vocational high schools. However, it can be said that variables related to family background or socio-cultural and socioeconomic characteristics of families are more decisive in vocational high schools. Because it turns out that the children of families with similar socio-cultural and socio-economic characteristics are clustered in these high schools. For example, in an analysis of 2012 PISA data, it has been determined that the children of families in the highest 20% socioeconomically in Turkey are mainly educated in Turkey's best high schools (such as Science or Anatolian High Schools). This rate is 51% for Science high schools and 42% for Anatolian high schools. On the other hand, 23% of vocational high school students come from the lowest 20% slice (Oral & Mcgivney, 2014). This data is collected by the education system through certain mechanisms, primarily central examinations, by selecting individuals according to their socio-economic and socio-cultural characteristics, and to certain institutions; Afterwards, he supports the thesis that he placed in jobs and professions within the employment structure. In addition, it is possible to talk about the variables specific to vocational high schools regarding academic achievement. Policies regulating the transition of vocational high schools to higher education have the potential to affect academic achievement through attitudes towards school to the extent that they reduce the demand for these high schools. The concentration of students with low academic success rates in these schools may adversely affect the perception of students, parents, teachers, school administrators and even society towards these schools. Moreover, this situation is not unique to Turkey; a similar perception is also mentioned in countries such as Japan, USA and Malaysia. It is stated that in the relevant countries, vocational high schools are perceived as secondary schools towards which students with low socioeconomic status and academic success tend to, as in Turkey (Affero & Razali, 2013; MoNE, 2018a; Tsukamoto, 2016). On the other hand, the concentration of students with low academic achievement in the same schools negatively affects the school climate, as well as depriving students of successful role models and peer learning. In particular, the findings of studies on level classes provide data supporting this argument (Aslan, Küçüker, & Gürbüzler, 2014; Palaniappan, 2004; Slavin, 1987; Zimmer, 2003).

As can be seen, academic success is a problem that has been examined by many researchers in the national or international literature. However, the fact that there are studies based on variables that are so different and often disjointed on the subject point out both a difficulty for research in this field, the limitations of each research carried out and the need for more research. In order to overcome this gap in the literature, albeit to a certain extent, in accordance with the

analysis method used in the current study, the variables that are assumed to affect academic achievement are discussed in two categories: student level and school level. In the study, school level variables, the number of students and teachers of the school; student level variables, on the other hand, from the child's gender to study habits; it includes many variables from the socio-cultural and socioeconomic characteristics of the parents to the opportunities provided to the child or the child's attitude towards school. In the study, student level variables include not only the individual characteristics of the child, but also socio-cultural and socioeconomic variables related to the family. On the other hand, it does not seem possible to address all dimensions of academic achievement, which has the potential to be affected by many variables, in one study. As a matter of fact, the mentioned limitation is partially valid for this study as well. However, one of the features that make the research different from most studies in the national and international literature is its method. Especially in the majority of studies in the national literature on academic achievement, the variables that predict academic achievement were evaluated with classical regression analysis. In classical regression analyzes, since the assumption that the observations are independent from each other is violated, the standard errors are calculated smaller than they should be. However, since intergroup independence is taken into account for Level 1 (student) and Level 2 (school) variables in hierarchical models, the probability of erroneous estimation is minimized compared to single-level models (Raudenbush & Byrk, 2002 as cited in Atar & Atar, 2012). However, the second difference is that there is no study that directly addresses the academic success of students studying at vocational high schools in Turkey, except for national or international central exams. On the other hand, it is essential to examine the process of transformation from vocational high schools that admitted students through exams in the early 1990s to high schools that are now left at the mercy of forced address-based placements, from various perspectives, especially academic success. It is hoped that the research will fill the gap in the national literature on vocational high schools and guide policy makers or education administrators with analytical data, beyond the widely accepted assessments of increasing the academic success rates of these high schools.

1.1. Purpose of the Research

The aim of this study is to analyze the academic achievements of vocational high school students through student level and school level variables. For this purpose, answers to the following questions were sought:

1. Are there any significant differences between schools in terms of the academic achievement of students?

2. What are the student-level variables that show a significant relationship with students' academic success?

3. What are the school-level variables that show a significant relationship with students' academic achievement?

4. What are the school-level variables associated with students' academic achievement when the student-level variables that show a significant relationship with the students' academic achievement are added to the model?

2. Method

2.1. Research Model

The research is in the relational screening model as it aims to predict the academic achievement of vocational high school students on a two-level variable set, which are student at the first level and school at the second level. Studies designed with the relational survey

model aim to describe the relationships between two or more variables as they are (Balcı, 2005; Karasar, 2005).

2.2. The Study Group

The research was carried out with 778 twelfth grade students studying at Anatolian Vocational High Schools in five different types (Health Profession, Industry Vocational, Girl Vocational, Imam-Hatip and Trade Vocational) in a city center in the Black Sea Region. There are two reasons why twelfth grade students are preferred. First, it is desired to use graduation data in the evaluation of students' academic success. The second is that all of the twelfth grade students have been placed through the Basic Education to Secondary Education (BESE), which is a central exam. In the 2017-2018 academic year, the BESE exam was abolished, and both central and address-based placement applications were introduced. In the study, students who were placed according to similar criteria were evaluated. While determining the schools, five different types of vocational high schools, one from each of the vocational high schools in the central district, were included in the research. In high school types with more than one school, the selection was made randomly. In the study, all of the twelfth grade students in the schools that were not sampled, who were at the school on the days of the application and agreed to answer the scale, were included in the study. Since the aim of this study is to determine the relationships between the variables, it is not aimed to generalize the results to a target population. Therefore, the research is an "internal validity" study (Balcı, 2005, p. 79).

During the data collection process, scales and questionnaires were distributed to 1000 students; 792 of these scales and questionnaires were returned, but some of them were not included in the analysis because they were not filled in properly, and some of them were not included in the analysis due to the extreme value examination made before the analysis. The research was carried out on the data of 778 participants.

Table 1. *Personal characteristics of students and parents*

Personal characteristics	f	%	Personal characteristics	f	%
Student's Gender			**Number of siblings**		
Female	429	55,1	Singleton	23	3,0
Male	349	44,9	2-3 Siblings	484	62,2
			4-5 Siblings	216	27,8
			6-10 Siblings	55	7,1
Mother Education			**Father Education**		
Illiterate	48	6,2	Illiterate	25	3,2
Literate	26	3,3	Literate	8	1,0
Primary school graduate	423	54,4	Primary school graduate	259	33,3
Secondary school graduate	185	23,8	Secondary school graduate	204	26,2
High school graduate	81	10,4	High school graduate	215	27,6
College-faculty graduate	14	1,8	College-faculty graduate	62	8,0
Master's-PhD graduate	1	0,1	Master's-PhD graduate	5	0,6
Mom working			**Dad working**		
Working	105	13,5	Working	641	82,4
Not working	673	86,5	Not working	137	17,6

Personal characteristics	f	%	Personal characteristics	f	%
Mother Occupation			**Father occupation**		
Professional occupations	4	0,5	Professional occupations	17	2,2
Officer	20	2,6	Officer	91	11,7
Worker+Farmer	62	8,0	Worker+Farmer	419	53,9
Tradesman	11	1,4	Tradesman	189	24,3
No job	679	87,3	No job	43	5,5
Other	2	0,3	Other	19	2,4
Household income			**Annual Education Expenditure for Child**		
2000 TL and below	356	45,8	1000 TL and below	337	43,3
Between 2001-4000	322	41,4	Between 1001-2000 TL	266	34,2
Between 4001-6000	81	10,4	Between 2001-3000 TL	100	12,9
6001+	19	2,4	3001+	75	9,6

2.3. Data Collection

In the study, two data collection tools were used for the variables related to the student level. The data of the study on student level variables were collected through a questionnaire consisting of 25 questions developed by the researchers. While developing the questionnaire, in addition to the literature review, interviews were conducted with school administrators and teachers regarding the variables that may affect students' academic achievement. A questionnaire consisting of 25 questions was developed based on the literature review and interviews. The developed questionnaire was presented to the expert opinion and some questions were arranged in line with the suggestions of the experts. The questionnaire includes questions about the students' personal information and study habits, as well as the parents, the educational environment and opportunities provided by the parents to the child.

Students' attitudes towards school were collected using the "Attitudes Towards School Scale (ATSS)" developed by Alıcı (2013). ATSS is a 20-item, 5-point Likert-type scale developed to determine high school students' attitudes towards school, ranging from "strongly disagree" to "strongly agree". The scale shows a three-component structure with a single factor. The scale consists of the sub-factors "School as a Barrier to Personal Development" (eight items), "School as a Supporter of Personal Development" (eight items) and "School as a Missing Entity" (four items). The Cronbach's Alpha reliability for the whole scale was 0.907 and the alpha reliability for its sub-factors was 0.871, respectively; it was calculated as 0.813 and 0.786. These values show that the scale as a whole and its sub-components are consistent within themselves. Fit indices of the scale, RMSEA= .056; CFI = .98; GFI = .92; AGFI = .90; RMR = .088 (Alıcı, 2013). Cronbach alpha values were calculated as .903 for the whole scale, and .846, .867 and .787 for subcomponents, respectively. The goodness of fit values calculated as a result of DFA are as follows; $\chi2= 373.06$, sd = 157, $\chi2/sd= 2.37$, RMSEA= .04, GFI= .95, AGFI=.94, CFI=.99, and RMR=.040. The data show that the scale is valid and reliable for this study as well.

In the study, the school level variables were obtained through the MEIS forms provided by the school administrations. First of all, the school level variables that have the potential to affect the academic achievement of the students were examined by scanning the literature. In line with the literature, the total number of students and teachers of the school were used as school level variables. Graduation averages were included in the analysis as a measure of the academic achievement of the participants. Graduation averages of the participants were taken from the

schools they graduated from. The participants' mean graduation scores are the dependent variable of the study.

2.4. Data Analysis

The collected data were coded by the researchers and transferred to the computer environment. SPSS 22.0 package program and HLM 8.0 program for Hierarchical Linear Model (HLM) were used to organize or analyze the data. The variables in the study show a hierarchical structure at the student and school level. Each school and each student has characteristics inherent in them and these features may differ. However, students can also be affected by the characteristics of the schools they attend. Since students are also affected by school level variables in multilevel data, it is not appropriate to use single level models. According to Raudenbush and Byrk (2002 cited in Atar and Atar, 2012), analyzes are inadequate when linear regression analysis is used for hierarchically structured data because common variance is neglected in research. Because when classical linear regression analysis is applied to a hierarchical data set, the standard errors are calculated smaller than they should be, since the assumption that the observations are independent from each other is violated. This causes the estimated regression coefficients to be higher in importance (overestimation). However, hierarchical models are also based on regression analysis, but since intergroup independence is also taken into account for Level 1 (student) and Level 2 (school) variables in these models; compared to single-level models, the probability of erroneous estimation is minimized.

The path followed in the analysis is as follows:

1. In the study, before the data were analyzed, the data set was examined in terms of missing data and extreme values, and necessary corrections were made.

2. For the purposes of this research, a different hierarchical model was used for each purpose.

a. Accordingly, the One-Way ANOVA with Random Effects was used to test whether there is a significant difference between the schools in terms of the graduation scores of the students, which is the first sub-purpose of the research. The model is the simplest of the two-level hierarchical linear models; it does not include predictive variables that explain the variance of graduation scores at both the first and second levels. Therefore, it is also called a fully unconditional model (Raudenbush & Bryk, 2002 as cited in Atar & Atar, 2012). This model estimates how much of the differences observed in graduation scores are due to students' individual differences and how much is due to the school environment.

b. The Random-Coefficients Regression Model was used to determine the student level (Level-1) variables that significantly predict the graduation scores of the students, which is the second sub-purpose question of the research. In the random coefficients regression model, the first level of the model to explain the part of the differences in graduation achievement arising from individual differences between students is based on gender, mother's education, father's education, family's social security, pre-school education status of the child, daily study habits, average annual income of the family and annual children. The child's attitude towards school was added as well as the variables of education expenditure for among these variables, the continuously variable ones were included in the model by centered on their general mean (grand mean centering).

c. The third sub-objective of the study is to determine the school-level variables (Level-2) that significantly predict students' graduation scores. For this purpose, the Means as Outcomes Regression Model was used. As the school level variables, the total number of students and the total number of teachers were used. The reason why school level variables are limited is the low number of schools.

d.   The fourth sub-purpose question of this study is "What are the school-level variables related to the academic achievement of students when the student-level variables that have a significant relationship with the academic achievement of the students are added to the model?" is the question. In order to answer this question, the Intercepts-and-Slopes-as Outcomes Model was used. This model, which includes student (Level-1) and school (Level-2) variables together, is called the full model (Raudenbush & Byrk, 2002 as cited in Atar & Atar, 2012).

3. The assumptions about multiple connections and models were tested for the data set before the analyzes were performed, and it was determined that the assumptions were met.

3. Results

3.1. Findings Regarding the Determination of Differences Between Schools in terms of Graduation Scores of Students

The first sub-purpose question of the research is about whether the academic achievement of students differs between schools. To answer this question, the One-Way ANOVA with Random Effects, one of the Hierarchical Linear Models, was used. In the equation in which the graduation success (M_{ij}= graduation) of student i at school J is estimated, β_{0j} is interpreted as the graduation success average of school j, and r_{ij} is interpreted as the difference between the graduation success of student i at school j from the graduation success average of school j. β_{0j}, called the intersection coefficient, is the constant parameter in the model, and, the first-order error term, is the random parameter in the model. It is assumed that this parameter has a normal distribution, its mean is 0 and its variance is σ^2. In the equation where the intercept coefficient (β_{0j}) at the first level of the model is considered as the dependent variable, γ_{00}, is the general graduation success average, and u_{0j} is interpreted as the difference between the graduation success average of school j and the general graduation average. It is assumed that the u_{0j} parameter, also called the second-order error term, has a normal distribution, its mean is 0 and its variance is τ_{00} (Atar, 2014). Accordingly, the following models were established. The estimation of fixed effects as a result of One-Way ANOVA for the established model is given in Table 2.

Level-1 Model	$(M_{ij}) = \beta_{0j} + r_{ij}$
Level-2 Model	$\beta_{0j} = \gamma_{00} + u_{0j}$
Mixed Model	$(M_{ij}) = \gamma_{00} + u_{0j} + r_{ij}$

Table 2. *The estimation of constant effects obtained from the random effect one-way ANOVA model*

Fixed Effect	Constant	SH	t
For Coefficient β_{0j}, Average School Mean, γ_{00}	70.97	3.31	21.47*

* p<.05

When Table 2 is examined, the difference between school averages in terms of graduation averages differs significantly from zero. In other words, it is seen that the averages of the schools included in the analysis differ significantly from each other (t = 21.47, p <.05). Accordingly, when a 95% confidence interval is established around the overall graduation success average, it can be said that the real value of the overall graduation success average in the research province is in the range of 70.97 ± (1.96) (3.31) = 64.48 - 77.46 points with 95% probability. The estimation of the variance components of the Random Effect One Way

ANOVA Model, which was made in line with the first sub-purpose of the research, is given in Table 3.

Table 3. *The estimation of variance components of the random effect one-way ANOVA model*

	Standard Deviation	**Variance components**	χ^2	**s.d.**	**Explained %**
School average, u_{0j}	7.36	54.22	531.558*	4	.51
Level-1 Effect, r$_{ij}$	7.23	52.24			

* p<.05

According to Table 3, the variance between the schools' graduation averages is estimated to be 54.22. At the student level, the variance of the graduation scores of the students within the framework of the school average was calculated as 52.24. The fact that the variability between schools is statistically significant (p<.05, sd=4) shows that there are significant differences between the average graduation achievements of vocational high schools in the research province. Possible value range for school averages is 70.97 ± (1.96) (7.36), in other words, school averages are between 56.54 and 85.40 points with 95% probability. According to this result, it can be said that the graduation scores among the schools in the sample are in a wide range.

In order to determine how much of the variance in the graduation scores of the students is due to the difference between schools, the τ00 (variance component) estimates of the model for both levels are compared and the explained variance ratio index is obtained (Hox, as cited in 1995, Aksu, Güzeller & Eser, 2017). Accordingly, the explained variance value in β0j is calculated using the equation below.

Considering the variance values in Table 2, the variance values explained for the graduation achievement indicator were obtained. 51% (54.22/54.22+52.24) of the differences observed in graduation scores are due to the difference in average graduation scores between schools. In other words, the differences in the graduation scores of vocational high school students are due to school variables with a probability of 51% and variables at the student level with a probability of 49%. This differentiation between schools in terms of graduation scores is coincidental (x2 =531.558, sd=4, p<.05).

Another finding obtained from the analysis results of the one-way analysis of variance random effects model is the estimation of the graduation mean ($\beta 0j$) reliability coefficient (r=0.99). These values show that the sample mean used in the analysis predicts the actual school averages very reliably.

3.2. Examination of Student Level Variables Related to Students' Academic Achievement

The Random Coefficient Model was used in the study to determine the student level variables that affect the academic success of vocational high school students. The model is established with first-order variables and is considered as a simple linear regression model. Accordingly, gender, number of siblings, number of siblings going to school, mother-father union, mother working, father working, mother education, father education, mother occupation, father occupation, getting preschool education, going to school course, going to study/classroom, studying. hours, extracurricular reading habits, leisure use, computer at home, internet at home, number of extracurricular books at home, presence of study room, ownership of the house, heating style of the house, household income, education expenditure for the child, social security, school adjustment variables Level. It is included in the model as -1 variables. The model established with these variables is given below.

Level-1:

$(Y_{ij}|OPV) = \beta_{0j} + \beta_{1j}(Gender_{ij}) + \beta_{2j}(Number\ of\ siblings_{ij}) + \beta_{3j}(Number\ of\ siblings\ going\ to\ school_{ij}) + \beta_{4j}(Parent\ union_{ij}) + \beta_{5j}(Mom\ working_{ij}) + \beta_{6j}(Dad\ working_{ij}) + \beta_{7j}(Mom\ training_{ij}) + \beta_{8j}(Dad\ training_{ij}) + \beta_{9j}(Mother\ occupation_{ij}) + \beta_{10j}(Father\ occupation_{ij}) + \beta_{11j}(Preschool\ education_{ij}) + \beta_{12j}(Go\ to\ school\ course_{ij}) + \beta_{13j}(Going\ to\ study/classroom_{ij}) + \beta_{14j}(Study\ hours_{ij}) + \beta_{15j}(Extracurricular\ reading\ habit_{ij}) + \beta_{16j}(Leisure\ use_{ij}) + \beta_{17j}(Computer\ at\ home_{ij}) + \beta_{18j}(Internet\ at\ home_{ij}) + \beta_{19j}(Number\ of\ extracurricular\ books\ at\ home_{ij}) + \beta_{20j}(Presence\ of\ study\ room_{ij}) + \beta_{21j}(Ownership\ of\ the\ house_{ij}) + \beta_{22j}(How\ the\ house\ is\ heated_{ij}) + \beta_{23j}(Household\ income_{ij}) + \beta_{24j}(Education\ expenditure\ for\ the\ child_{ij}) + \beta_{25j}(Social\ security_{ij}) + \beta_{26j}(Attitude\ towards\ school_{ij}) + r_{ij}$

Level-2:

$\beta_{0j} = \gamma_{00} + u_{0j}$

$\beta_{1j} = \gamma_{10} + u_{1j}$

$\beta_{26j} = \gamma_{260} + u_{26j}$

Mixed Model:

$Y_{ij}|OPV) = \gamma_{00} + u_{0j} + (\gamma_{10} + u_{1j})(Gender) + (\gamma_{20} + u_{2j})(Number\ of\ siblings) + (\gamma_{30} + u_{3j})(Number\ of\ siblings\ going\ to\ school) + (\gamma_{40} + u_{4j})(Parent\ union) + (\gamma_{50} + u_{5j})(Mom\ working) + (\gamma_{60} + u_{6j})(Dad\ working) + (\gamma_{70} + u_{7j})(Mom\ training) + (\gamma_{80} + u_{8j})(Dad\ training) + (\gamma_{90} + u_{9j})(Mother\ occupation) + (\gamma_{100} + u_{10j})(Father\ occupation) + (\gamma_{110} + u_{11j})(Preschool\ education) + (\gamma_{120} + u_{12j})(Go\ to\ school\ course) + (\gamma_{130} + u_{13j})(Going\ to\ study/classroom) + (\gamma_{140} + u_{14j})(Study\ hours) + (\gamma_{150} + u_{15j})(Extracurricular\ reading\ habit) + (\gamma_{160} + u_{16j})(Leisure\ use) + (\gamma_{170} + u_{17j})(Computer\ at\ home) + (\gamma_{180} + u_{18j})(Internet\ at\ home) + (\gamma_{190} + u_{19j})(Number\ of\ extracurricular\ books\ at\ home) + (\gamma_{200} + u_{20j})(Presence\ of\ study\ room) + (\gamma_{210} + u_{21j})(Ownership\ of\ the\ house) + (\gamma_{220} + u_{22j})(How\ the\ house\ is\ heated) + (\gamma_{230} + u_{23j})(Household\ income_{ij}) + (\gamma_{240} + u_{24j})(Education\ expenditure\ for\ the\ child) + (\gamma_{250} + u_{25j})(Social\ security) + (\gamma_{260} + u_{26j})(Attitude\ towards\ school) + r_{ij}$

In order to examine the significance of the model established with the inclusion of Level-1 variables, the method based on the test of the significance of the Deviance value was used (as cited in Karakoç Alatlı, 2020 from Garson, 2013). Accordingly, the Level-1 model was determined to be statistically significant ($\chi^2=466.261$, $p<0.05$). Table 4 presents the results of the analysis conducted to determine whether student variables related to graduation success are a significant predictor of graduation success.

Table 4. *The estimation of constant effects related to the level-1 random coefficient model*

Cluster	Constant effects	Coefficients	Standard error	t-ratio	s.d.
Demographic features	Overall achievement, γ_{00}	66.49	3.11	21.38*	
	Gender, γ_{10}	*1.89*	*0.57*	*3.30**	
	Number of siblings, γ_{20}	-0.15	0.22	-0.68	747
	Number of siblings going to school, γ_{30}	*0.52*	*0.26*	*2.01**	
	Parent union, γ_{40}	-0.56	0.78	-0.72	
Socio-cultural level	Mom working, γ_{50}	-0.79	1.34	-0.59	
	Dad working, γ_{60}	-1.26	0.71	-1.79	
	Mom training, γ_{70}	-0.04	0.10	-0.37	747
	Dad training, γ_{80}	*0.28*	*0.09*	*3.34**	
	Mother occupation, γ_{90}	0.42	1.35	0.31	
	Father occupation, γ_{100}	-0.27	0.78	-0.35	
Educational support	Preschool education, γ_{110}	0.14	0.52	0.26	
	Go to school course, γ_{120}	*2.76*	*0.63*	*4.41**	747
	Going to study/classroom, γ_{130}	*2.53*	*0.61*	*4.16**	
Study habit	Study hours, γ_{140}	*2.71*	*0.66*	*4.13**	
	Extracurricular reading habit, γ_{150}	-1.03	0.59	-1.74	747
	Leisure use, γ_{160}	0.91	0.52	1.77	
Opportunities for the child	Computer at home, γ_{170}	0.92	0.58	1.57	
	Internet at home, γ_{180}	0.48	0.60	0.81	
	Number of extracurricular books at home, γ_{190}	1.52	0.57	2.68*	747
	Presence of study room, γ_{200}	-1.07	0.58	-1.8	
Economic indicators	Ownership of the house, γ_{210}	0.36	0.60	0.60	
	How the house is heated, γ_{220}	-0.81	0.61	-1.34	
	Household income, γ_{230}	-0.82	0.58	-1.41	747
	Education expenditure for the child, γ_{240}	*1.38*	*0.63*	*2.17**	
	Social security, γ_{250}	*2.04*	*0.71*	*2.85**	
Attitude	Attitude towards school, γ_{260}	0.49	0.36	1.38	747

* $p<.05$

When Table 4 is examined, variables such as gender, number of siblings going to school, father's education level, going to school, going to study center/classroom, daily study hours, number of extracurricular books at home, education expenditure for the child and social security are significant predictors of graduation success was determined as ($p<.05$). Accordingly, the graduation scores of female students are 1.89 points higher than male students. A one-unit increase in the number of siblings going to school is 0.52 in the academic success of the student; one-year increase in father's education level, 0.28; child attending a school course 2.76; Going to study center/classroom caused an increase of 2.53 points. On the other hand, the academic success of students who state that they study for one or more hours a day is 2.71 points higher than those who state that they do not study at all. At home, extracurricular novels, poems, stories, etc. The academic achievement of those who have 25 or more books is 1.52 points higher than the others. In the set of economic indicators, two

variables were found to be significant. The annual education expenditure for the child is 1.38 points above the academic achievement of those who are above the average of the research group; It is seen that children who have social security in their household due to their mother or father are 2.04 points higher than those who do not.

On the other hand, one-unit increase in the number of siblings (-0.15 points), separation of parents (-0.56 points), mother being a housewife (-0.79 points), father not working (-1.26 points), one-year increase in mother's education level (-0. ,04 points), the father being a farmer (-0.27 points), the child not having the habit of reading extracurricular books (-1.03 points), not having a study room (-1.07 points), heating the house with a stove (-0.81 points), minimum household income Although variables such as being below the wage (-0.82 points) were not significant at the p<.05 level, they caused a decrease in the academic achievement of the student. The mother has a profession (0.42 points), the child has pre-school education (0.14 points), does not spend daily time on a computer/internet/tablet/smart phone or television for entertainment (0.91 points), has a computer at home (0.92 points), does not have internet access at home. Variables such as having a high school education (0.48 points), not renting a house (0.36 points) and having a high level of school adjustment (0.49 points) contributed to the increase in academic achievement, although they were not significant at the p<.05 level. The findings regarding the estimations of the variance components in the model established for the student-level variables that predict the graduation success of the students are given in Table 5.

Table 5. *The estimated variance components for level-1 random coefficient model*

Coincidental effects	Standard Deviation	Variance Component	s.d.	χ^2
School average, u0j	6.16	37.94	4	466.26*
Level-1 effect, rij	6.66	44.36		

* p<.05

Table 5 presents the results of the test of the variance of graduation achievement scores as a result of adding Level-1 variables and the significance of the random effect of variance in terms of school level. Accordingly, the variance ratio index explained can be obtained by comparing the variance values estimated with the two models for graduation success. The variance rate explained at Level-1 (52.24-44.36 / 52.24) is 15.08%. Accordingly, approximately 15.08% of the student-level variance in graduation success is explained by the student-level variables given above. The reliability of the model established at the student level was estimated to be approximately 0.99. Accordingly, it can be said that the estimation is quite reliable.

3.3. Examination of School Variables Related to Academic Achievement of Students

The third sub-objective of the study is to determine the school-level variables (Level-2) that significantly predict students' graduation scores. For this purpose, the Means as Outcomes Regression Model was used. The school variables addressed for the graduation success of the students are "number of students in schools" and "number of teachers in schools".

Level-1:

$(Y_{ij}|OPV) = \beta_{0j} + r_{ij}$

Level-2:

$\beta_{0j} = \gamma_{00} + \gamma_{01}$ (Number of students) $+ \gamma_{01}$ (Number of teachers) $+ u_{0j}$

Mixed Model:

(Yij|OPV) = γ00 + γ01 (Number of students) + γ01 (Number of teachers) + u0j + rij

The analysis results obtained from the model established for the school level are given in Table 6.

Table 6. *The estimation of constant effects for level-2 random coefficients model*

Constant effects	Coefficients	Standard Error	t-ratio	s.d.
Overall achievement average, γ_{00}	70.97	2.68	26.44*	2
Number of students, γ_{01}	-0.03	0.02	-1.82*	
Number of teachers, γ_{01}	0.32	0.33	0.99	

* p<.05

According to Table 6, it was determined that among the school level variables, the number of students in schools significantly predicted the graduation success of students (t=-1.82, p<.05). An increase of one standard deviation in the total number of students in the school causes a decrease of 0.03 points in the graduation scores of the students. On the other hand, it was determined that the number of teachers variable was not a significant predictor of graduation success (t=0.99, p>.05).

Table 7. *Estimation of variance components for level-2 random coefficients model*

Coincidental effects	Standard Deviation	Variance Components	s.d.	χ^2
School average, u0j	5.97	35.66	2	171.91
Level-1 average, rij	7.23	54.22		

* p<.05

In Table 7, the variance of students' graduation scores was calculated as 35.66 by adding Level-2 variables to the model. In the study, the variance rate index was obtained by comparing the variance values estimated with the two models for the average school graduation success. The variance ratio explained in Level-2 [(54.22-35.66)/54.22] was calculated as 0.34. Accordingly, 34% of the variance between schools in graduation success is explained by Level-2 variables. After controlling the mean Level-2 variables of graduation achievement, the ratio of variance between schools [35.66/(35.66+52.24)] was calculated as 0.40. After controlling for the mean school variables, approximately 40% of the variance in graduation success is between schools, and this differentiation between schools is coincidental (□2=171.91, sd=2, p<0.05).

In the analysis of the mean model as the dependent variable, the reliability for the school graduation average was estimated to be approximately 98%.

3.4. Investigation of the School and Student Variables together Associated with Academic Success

When student-level variables that show a significant relationship with students' academic achievement are added to the model, the Intercepts-and-Slopes-as Outcomes Model was established to determine the school level variables related to students' academic achievement.

Level-1:

$(Y_{ij}|OPV) = \beta_{0j} + \beta_{1j}(Gender) + \beta_{2j}(Number\ of\ siblings\ going\ to\ school)\ \beta_{3j}(Dad\ training) + \beta_{4j}(Go\ to\ school\ course) + \beta_{5j}(Going\ to\ study/classroom) + \beta_{6j}(Study\ hours) + \beta_{7j}(Number\ of\ extracurricular\ books\ at\ home) + \beta_{8j}(Education\ expenditure\ for\ the\ child) + \beta_{9j}(Social\ security) + r_{ij}$

Level-2:

$\beta_{0j} = \gamma_{00} + \gamma_{01}\ (Number\ of\ students) + u_{0j}$

$\beta_{1j} = \gamma_{10} + \gamma_{11}\ (Number\ of\ teachers) + u_{1j}$

....

….

$B_{9j} = \gamma_{90} + \gamma_{91}\ (Number\ of\ students) + u_{9j}$

Mixed Model:

$(Y_{ij}|OPV) = \gamma_{00} + \gamma_{01}(Number\ of\ students_{ij}) + \gamma_{10}(Gender_{ij}) + \gamma_{20}(Number\ of\ siblings\ going\ to\ school_{ij}) + \gamma_{30}(Dad\ training_{ij}) + \gamma_{40}(Go\ to\ school\ course_{ij}) + \gamma_{50}(Going\ to\ study/classroom_{ij}) + \gamma_{60}(Study\ hours_{ij}) + \gamma_{70}(Number\ of\ extracurricular\ books\ at\ home_{ij}) + \gamma_{80}(Education\ expenditure\ for\ the\ child_{ij}) + \gamma_{90}(Social\ security_{ij}) + u_{0j} + r_{ij}$

The analysis results regarding the estimation of constant effects for these models are given in Table 8.

Table 8. *Examination of school and student variables associated with graduation scores*

Constant effects	Coefficients	Standard Error	t-ratio	s.d.
Overall achievement average, γ_{00}	63.61	2.52	25.23	
Number of students, γ_{01}	-0.01	0.01	-1.71	
Gender, γ_{10}	1.71	0.56	3.03*	
Father education, γ_{20}	0.20	0.07	2.75*	
Social security, γ_{30}	1.30	0.68	1.90*	
Number of siblings going to school, γ_{40}	0.47	0.23	2.02*	764
Going to school course, γ_{50}	2.95	0.62	4.77*	
Going to study/classroom, γ_{60}	2.31	0.59	3.88*	
Study hours, γ_{70}	2.72	0.63	4.31*	
Number of extracurricular books at home, γ_{80}	1.37	0.55	2.48*	
Educational expenditure for the child, γ_{90}	1.27	0.63	2.03*	

* $p<.05$

In the estimation of the fixed effects of the full model in Table 8, all first and second level variables, which are a significant predictor of graduation success, were included in the analysis. Accordingly, the variable of the total number of students of the school is not a significant predictor of the graduation success of the students at the school level (t=-1.71, p>.05). When the results of the analysis are examined in terms of student variables, it is found that the variables of gender, father's education, social security, number of siblings going to school, attending school courses, going to study/classroom, study hours, number of extracurricular books at home, education expenditure for the child are significant predictors of students'

graduation scores. observed (p<.05). The analysis results for the estimation of the variance components for the full model are given in Table 9.

Table 9. *The Estimation of variance components related to the full model*

Coincidental effect	Standard Deviation	Variance components	s.d.	χ^2
School average, u0j	5.16	26.61	3	249.31
Level-1 effect, rij	6.71	44.99		

* p<.05

It is seen in Table 9 that the variance of the graduation scores of the schools is estimated as 26.61 according to the full model. According to the full model obtained by including student and school variables in the model, the difference between graduation scores was calculated as approximately 37% [26.61/(26.61+44.99)]. Accordingly, as a result of including both level variables in the model, there is a decrease of approximately 14% in the explained variance value. The reliability of the full model was estimated to be approximately 98%.

4. Discussion, Conclusion and Suggestions

When the demographic changes related to the students within the scope of the research are examined, it is seen that the socio-cultural and socioeconomic capital of the families of the students is low. The majority of the students come from the lower socioeconomic income group. A significant portion of them (45.8%) live below the poverty line. In October 2018, the poverty line is 6.252 TL (Confederation of Turkish Trade Unions [TÜRK-İŞ], 2018). The average size of the family in the research is five people, because the number of siblings of students varies between two and ten (average 3). This is larger than the average family size in Turkey (average 2) (Turkish Statistical Institute [TUIK], 2016). The majority of mothers are housewives, and the majority of fathers are farmers or workers. There are hardly any mothers or fathers in professional occupations (0.5% for mothers, 2.2% for fathers). The education level of the parents is below the Turkey average. According to the results of the 2017 address-based census, the average education period of the population aged six and over is 7.8 years. This period is 7.1 years for women and 8.2 years for men. The average education period of the students within the scope of the research is 6.0 years for mothers and 8.0 years for fathers. Vocational high school students are widely accepted to be unsuccessful in terms of intelligence and ability levels. The education level of their parents is lower than the average of Turkey, the number of siblings is above the average, they have a relatively large family structure and the overwhelming majorities have to cope with poverty. The social and cultural capital of vocational high school students does not support their academic success. The findings of other studies on academic success (ERG, 2009; 2010; MoNE, 2013; Oral & Mcgivney, 2014) are in line with the findings of this study on students' family profiles.

The first sub-objective of the study is about whether students' academic achievement differs between schools. In the study, the academic achievement of the students showed a significant difference according to the schools. Differences in achievement among secondary education institutions in Turkey is a frequently expressed problem (Atar, 2014; Berberoğlu & Kalender, 2005; Bakış, Levent, İnsel & Polat, 2009; MoNE, 2010). Both the international level exams (PISA, TIMMS, etc.) and the data on transition to higher education held at the central level regarding the achievement differences between schools at the secondary education level support this finding. For example, in a study conducted by Karakoç Alatlı (2020) with 2015 PISA data, it was found that the science literacy scores of students differ according to schools and the success differences between schools in Turkey are higher than in Singapore, which is compared. When the results of the Higher Education Exam Placement (YKS) for 2020 are examined by school types; It is seen that the ratio of the graduates of official general high

schools (who teach in a foreign language) among the total undergraduate programs is 23.1%, and the ratio of those who graduate from vocational high schools, excluding imam-hatip high schools, is 5.3%. On the other hand, this rate is 54.5% in social sciences high schools, 49.4% in science high schools, 27.9% in official Anatolian high schools teaching foreign languages, 16.4% in imam-hatip high schools, 3.5% in trade vocational high schools, and technical high schools. 5.5% in industrial vocational high schools and 2.7% in sports high schools (Higher Education Information Management System, 2020). The results of placement in higher education institutions in 2020 are consistent with the research finding. On the other hand, in an analysis made according to 2012 PISA results in Turkey, it was found that 61% of the variance in students' mathematics scores was due to differences between schools (Anıl, Özer Özkan, & Demir, 2012).

In the research, the two variables that have the highest impact on the academic success of the child are the child's attendance to school courses and to the study center/classroom. In fact, both variables mean that students receive additional lessons outside of standard school hours. In Turkey, private teaching institutions have been closed since 2015, and weekend courses have been opened in study centers and schools. There are many studies that show that private teaching institutions or study centers make a significant difference in the academic success of students and thus increase academic success (Akbaba-Altun & Çakan, 2008; Aslan, 2017; Morgil, Yılmaz, Seçken & Erökten, 2000; Morgil, Yılmaz & Geban, 2001; Tansel, 2013). For example, in a study conducted by Başol and Zabun (2014), it was determined that among the students who took the High School Placement Exams (HSPE), which determines the transition to secondary education institutions, those who went to a private teaching institution or study center had a significantly higher success score than those who did not. A similar result is also found in Aslan's (2017) research. In the study evaluating the success of the Transition from Basic Education to Secondary Education (BESE) exam, it was found that the academic success of the students who went to private teaching institutions or study centers was significantly higher than those who did not, and contrary to the current research, there was no significant difference in the BESE exam success of the students who went to the weekend school courses. In this study, the effect of preschool education in the context of the educational support provided to the child was also examined. Contrary to the widespread acceptance regarding the positive effect of preschool education on academic achievement (ERG, 2009), preschool education did not make a significant difference on academic achievement in the study.

In academic achievement studies, the child's study habits are often one of the variables taken into account. In this study, a significant difference in graduation success was found between students who study for one or more hours a day and those who do not have the habit of studying daily. Regular study habits are one of the student-level variables that explain the academic success of students. There is research supporting this finding. For example, in a study conducted by Ozan (2011) the relationship between the study habits of 6th, 7th and 8th grade primary school students and their success in Science and Technology course was examined. A moderately significant relationship was found between the academic success grades of the students in the Science and Technology course and their study habits. Similarly, Bıyıklı (2017) found a moderate and positive relationship in his study examining the study habits of secondary school students. There are other studies that show that planned study habits predict or positively affect students' academic success (Acar Güvendir, 2014; Anıl & Özer, 2011; Kara & Gelbal, 2013; Öksüzler & Sürekçi, 2010). In this study, while the study habits of the students affected their academic success, no significant relationship was found between the time they set aside for entertainment and their extracurricular reading habits and their academic success.

In the research, the relationship between genders, number of siblings, number of siblings going to school and academic achievement was also examined. Among these variables, there was a significant relationship between gender and the number of siblings going to school and the academic success of the students, but no relationship was found between the number of siblings and academic success. In the study, it was determined that female students were more successful than males. This difference in success may be due to the social gender perception of families. Because when the education, working status and occupation of the parents of the students are examined, it is seen that a significant part of them has rural origin, patriarchal and conservative family structure. Even if they live in the city center, sending girls to secondary education is still a serious problem in families who cannot break their connection with the countryside (Aslan, 2021). This is especially true for girls sent to school; it could mean either doing well in school or getting married and/or being expelled from school at an early age. Girls living in patriarchal families, especially in rural areas, may not be given the chance to fail as much as boys. The limited options available for girls and the fact that girls realize this at a very early age may cause them to make more efforts to be successful. As a matter of fact, there are other studies showing that girls are more successful than boys. (Büyüköztürk & Denizkulu, 2002; Chiu & McBride Chang, 2006; Giambona & Porcu, 2015; Halpern, 2007; Koç, Avşaroğlu & Sezer, 2004; Lynn & Mikk, 2009; Pomerantz, Altermatt & Saxon, 2002). On the other hand, there are studies that show that there is no difference between male and female students in terms of academic achievement (Sadi, Uyar, & Yalçın, 2014) or that male students are more successful (Demir, Kılıç & Ünal, 2010; Türkan, Üner & Alıcı, 2015).

According to the results of the analysis, the number of siblings is not a significant variable in the academic success of the students; however, there are studies that have determined that an increase in the number of siblings or children in the household has a negative effect on the child's access to school and academic success (Bıkmaz, 2001). As a matter of fact, although there was no significant difference in this study, it was determined that the academic success of the children decreased as the number of siblings increased. However, it is seen that the academic success of children increases as the number of siblings going to school increases. This result may be due to two reasons. First, as the number of children going to school increases, parents' experience with school may be increasing. Secondly, the academic success of students may increase depending on the educational interactions between children. There are other studies that support the data of the current research that academic success increases especially as the number of children going to school increases (Aslan, 2017; Öksüzler & Sürekçi, 2010).

Another variable that affects the academic achievement of students is the social and economic status of the family. In the research, the relationship between the working statuses of the parents, their education level and occupation and the academic achievement of the students were discussed. Among these variables, only father's education level was found to be associated with the academic achievement of vocational high school students. On the other hand, no significant relationship was found between the education level of the mothers and the academic success of the children. Two reasons may have been effective here. The first of these is that the education level of the mothers is lower than that of the fathers; and the second, also related to the first reason, may be that the education level of the mothers is insufficient to support the students due to the fact that the students are at the secondary education level. As a matter of fact, the fact that the education level of mothers is lower than that of fathers and Turkey's average supports this finding. On the other hand, in many studies conducted on international exam success, data regarding the educational level of parents positively affect the academic success of the child (Alomar, 2006; Anıl, 2008; Anıl, Özer Özkan, & Demir, 2012; Aslan, 2017; İnce, 2016; Kuyper, Van der Werf, & Lubbers, 2000; Lemke et al., 2002; Long

& Pang, 2016; Bouhlila, 2017). In a comprehensive study conducted by Rinderman and Ceci (2018) on 15,297 children in the United States, Austria, Germany, Costa Rica, Ecuador, Vietnam and Brazil; In the cognitive development of children aged 4-22, the economic status of the families (income, assets) and the education level of the parents were investigated. In the study, it was concluded that the education level of the parents is more important than the financial wealth of the family in student success.

Another variable to be evaluated in relation to the socioeconomic status of the family is the working status and occupation of the parents. In the study, no significant relationship was found between both variables and academic achievement. Aslan's (2017) study evaluating the success of the Transition from Basic Education to Secondary Education (BESE) exam partially supports this finding. In the related research, while no significant relationship could be found between the working status of the father and academic success, it was determined that the exam success of children whose mothers were working was higher. In the same study, a significant relationship was found between the profession of parents and academic achievement. Especially the academic success of the students whose parents are public employees is significantly higher than the others. Similarly, in another study conducted with the PISA 2009 data of fourteen countries, it was determined that the education level and professional status of the parents are more important in student success than the financial wealth of the family (Xie & Ma, 2019). On the other hand, there are also studies that have determined that the profession of parents has no effect on academic achievement. For example, in a study conducted by DeGarmo, Forgatch, and Martinez (1999) with 238 divorced mothers with six-nine-year-old boys, it was found that mothers' occupation and income had no effect on children's academic success.

Some of the student level variables in the research are also related to the opportunities provided to the child. The effects of variables such as having a computer and internet at home, the number of extracurricular books and the child's own study room were also examined. These variables are also related to the socio-cultural and socioeconomic levels of the households. Of these variables, only a significant relationship was found with the number of extracurricular books at home. In the research, poems, novels, stories, dictionaries, etc. at home, this can be considered as one of the indicators of the socio-cultural capital of the families. The number of extracurricular books was determined as one of the variables explaining the academic success of the students. There are other studies that support this finding (Giambona & Porcu, 2015; Gülleroğlu et al., 2014; Kaya, 2017; Türkan, Üner, & Alıcı, 2015; Zasacka & Bulkowski, 2017). For example, Anıl and Özer (2011) found in a study they conducted with PISA 2006 Turkey data that the variable that most predicted Science and Mathematics achievement was the "time spent learning", and the second place was the extracurricular "literary" works at home. Both results determined by the researchers are consistent with these research findings.

On the other hand, there is no significant relationship between having a computer, internet and a study room at home and academic success. A similar conclusion was reached in the research of Acar Güvendir (2017). In the study in which PISA 2012 data were analyzed in the context of Mathematics achievement; No significant relationship was found between the student's own room, an environment suitable for working at home, and an internet connection and mathematics achievement. However, there are studies showing that having a computer, internet connection and a child's own study room predicts students' academic success or positively affects academic success (Dinçer & Kolaşin, 2009; Erdoğdu & Erdoğdu, 2015; Türkan, Üner & Alıcı, 2015). For example, in a study conducted by Kaya and Doğan (2017) with PISA 2012 data of 23,710 students from four countries (United States, Turkey, Finland, Israel); in all four countries, a significant relationship was found between the students' science

achievement and the education level of their parents, having a computer at home, using educational software, having world classics, poetry books and auxiliary books at home, the number of telephones, computers and books at home.

In this study, while some of the variables at the student level are related to the personal characteristics of the students such as gender, number of siblings, and study habits, an important part is related to the socio-cultural and socioeconomic characteristics of the child's family. There are also studies showing that these characteristics are more effective than personal characteristics in academic success (Coleman, 1988; Sirin, 2005). In the study, in the context of socioeconomic variables; the ownership of the house where the child lives, heating status, and household income, annual education expenditure for the child and whether the child has a social security from his mother or father were examined. Two of these variables, the annual education expenditure for the child and the child's social security, made a significant difference in academic achievement. No significant relationship was found between ownership of the house, heating status, household income and academic achievement. There are studies that show that household income makes a significant difference in academic achievement and access to school (Aslan, 2017; Öksüzler & Sürekçi, 2010). As in the current research, there are also studies showing that there is no effect of household income or a weak relationship. A study was conducted by Turmo (2004) to determine the factors affecting the science achievement of students in Scandinavian countries. For the purpose of the research, PISA 2000 data were analyzed and it was concluded that there was a weak relationship between household income and student's science achievement. However, it was found that there is a strong relationship between the cultural wealth of the family and the student's science achievement. In the current study, the fact that household income does not make a significant difference in the academic success of the child may be related to the fact that the income levels of the families of the students are homogeneous and low in general, and that almost all of them live below the poverty line.

While household income does not make a significant difference in the research, annual education expenditure for the child is one of the variables that explain academic success. The academic achievement of the children of the families whose annual education expenditure for the child is above the group average was found to be significantly higher than those of the lower ones. There are other studies showing that annual education expenditure for children positively affects academic achievement (Abbott & Fouts, 2003; Aslan, 2017). For example, one of the comprehensive studies examining the effect of socioeconomic factors was conducted by Sirin (2005). The study sample, which analyzed studies conducted between 1990 and 2000 through meta-analysis, consists of 101,157 students and 6871 schools. As a result of the study, a strong relationship was found between the socioeconomic status of the students' families and student achievement.

In the study, it was determined that the child's social security is one of the variables explaining academic success. For the secondary education level, this is a very significant and consistent finding with other data. Because the absence of social security in the household can be considered as an indicator of the child's ability to work outside of school and the level of household poverty. Both situations are negative in terms of education. As a matter of fact, a study conducted by ERG (2009) revealed that social security is especially important for boys. According to this research, the probability of participation in education increases by 20% for boys with social security in their households. Similarly, in Aslan's (2017) research, having social security in the household made a significant difference in the success of children in transition to secondary education. On the other hand, although socioeconomic background has important effects on success, according to PISA reports, there may be high achievers among

students with low socioeconomic status. It can be said that countries with a low socioeconomic level and successful achieve equality in education significantly (Fındık & Kavak, 2013).

Another student level variable that is expected to show a significant relationship with students' academic success is their attitude scores towards school. Although the academic achievement of the students increases as the students' attitude scores towards school increase, attitude towards school is not one of the predictors of academic success in this study. This finding is consistent with the findings of the research conducted by Atik in 2016. In the study conducted with 8,130 high school students studying in 11 Anatolian high schools, it was determined that students' attitudes towards school did not directly affect their academic achievement, but indirectly affected academic achievement through the variables of alienation from school and school burnout. There are also studies that detect a relationship between attitude towards school and academic achievement (Mombourquette, 2007).

In the study, the number of students and teachers of the school were considered as school level variables. While the number of students in the school is a significant predictor of academic success, no significant relationship was found between the number of teachers and academic success. This may be related to the norm staff calculations according to the schools. The fact that all of the schools are in the center and the number of teachers is determined according to the norm staff over the course load may have caused a significant difference between the schools. On the other hand, an increase of one standard deviation in the number of students in the school causes a decrease of 0.03 points in the academic achievement of the students. A study supporting this finding was conducted by Egalite and Kisida (2016). In their study, in which the researchers examined over one million student groups in the USA over longitudinal data, they found that as the size of the school increased, the academic achievement of students in Mathematics and Reading decreased and the negative effect of large schools on success was more significant in the upper grades. In a study conducted in 20 schools in Ankara, a positive relationship was found between the size of the school (the number of students in the school) and the academic achievement of the students. In the study, it was determined that the students in schools with a large number of students have higher Secondary Education Institutions Exam (SEIE) success. In another study conducted with PISA 2015 data, as the teacher/student ratio in the school increases, success increases, but as the school size (number of students) increases, student success decreases (Erdoğan & Acar Güvendir, 2019).

In the full model, this is determined as a significant predictor of the academic achievement of vocational high school students, and includes student and school level variables; while the student level variables did not change, the number of students in the school among the school level variables ceased to be significant. As a matter of fact, the differences in the graduation scores of vocational high school students in the study, when the student and school level variables are taken together, result from the school variables with a probability of 37% and the variables at the student level with a probability of 63%. It is seen that student level variables are more determinant in the academic success of vocational high school students than school level variables.

In order to increase the academic success of vocational high school students within the framework of the results obtained in the research, weekend courses planned in accordance with the level of the students can be expanded. Guidance services can follow an effective study program in order to gain regular study habits to students. Increasing the education level of parents by reducing the dropout rates of children from disadvantaged backgrounds with low socioeconomic status and preventing early marriage of girls, may be important in terms of increasing academic success in the long term. In households with low socioeconomic and socio-cultural levels, the Ministry of National Education can provide students with free

extracurricular literary books in cooperation with publishing houses. At the same time, one of the fields of activity of non-governmental organizations working in the field of education may be to create libraries primarily for the households where disadvantaged children live. The dissemination of such activities to all levels, starting from the pre-school education level, may increase the academic success in the secondary education level, especially in vocational education, in the long term. Considering the difference that parents' socio-cultural capital creates in academic success, non-formal education activities aimed at improving parents' perceptions of education and increasing their cultural capital can be given weight in schools. By re-establishing the link between vocational and technical education with employment and higher education, attracting successful students to these schools, changing the perception of these schools can contribute to better motivation of both students and teachers, thus increasing academic success. Since the overwhelming majority of vocational high school students live below the poverty line, political governments should implement an effective anti-poverty program; It may be suggested to provide cash support based on the number of children going to school so that there are no households without social security left and families can be supported for their education expenses.

In addition to these suggestions developed from the current research results, there are also suggestions that can be developed over the general academic achievement studies in the literature. When the results of the studies on academic success in the literature on the causes of failure are examined, many reasons have been identified; Some studies seem to reach contradictory results. The reasons for this situation are that the participants/sample are different, the studies were conducted at different times and in different school types and with different dependent variables. This differentiation revealed by the studies in the literature leads to the inability to reveal clear cause-effect or inter-variable relationships related to academic achievement. This situation creates uncertainty about what measures education administrators should take to increase academic success. In order to eliminate this uncertainty, research on academic achievement should be carried out in a continuous, systematic and institutional framework. In other words, the Ministry of National Education should employ educational science experts who will conduct research on the problems of the education system, especially academic success, in schools, districts and provincial organizations in order to increase academic success.

This research can be re-done by including other high school types and regional-level variables in the analysis. Each variable and/or each student's academic success history that is determined to affect academic success can be examined in depth with qualitative research methods. The small number of schools analyzed in this study can be considered as a limitation. In this context, it is recommended that similar studies be conducted with more schools.

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