Education and Science

Vol 40 (2015) No 179 181-192

Factors Related To University Entrance Examination Achievement: A Case Study from Turkey

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Abstract

This study explores the relationship between University Entrance Examination achievement and the factors that are socioeconomic status, interest and perception of success, and instructional activities. 2008 University Entrance Examination scores and a Student Questionnaire responded by 10,000 students are used to perform a multiple regression analysis to reveal the relationship between the mentioned factors and the raw scores of Turkish-social sciences and mathematics-science. The results indicate that 17% of the variability in Turkish-social sciences raw scores and 57% of the variability in mathematics-science raw scores were predicted by the determined factors. Besides, interest and perception of success in Turkish-social sciences and in mathematics-science are positively related to Turkish-social science raw scores and mathematics-science raw scores, respectively. Conversely, in addition to the negative relationship between Turkish-social raw scores and the interest and perception of success in mathematics-science, there is also a negative relationship between the mathematics-science raw scores and the interest and perception of success in Turkish-social science. Teacher-centered activities have a significant positive relationship with only Turkish-social sciences raw scores, though, student-centered activities have a negative relationship with both raw scores. Socioeconomic status also has a positive relationship with both raw scores.

Keywords

University entrance examination

Interest

Perception of success

Student-centered instructional activities

Teacher-centered instructional activities

Article Info

Received: 07.25.2014

Accepted: 03.25.2015

Online Published: 05.20.2015

DOI: 10.15390/EB.2015.3816

Introduction

Access to a higher education program is a major issue in many parts of the world, especially in countries where there is a limited quota for the programs. Therefore, in many countries, a centralized examination is usually required to select the students for the high demanded university programs. For instance, countries such as Japan, South Korea, China, and Turkey administer large-scale centralized university entrance examinations. On the other hand, admission to higher education in the USA, Canada and European Union countries may vary among each other but they generally have an interview step to reveal student's non-academic characteristics (Baird et al. 2011; Parry et al. 2006).

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Turkey has one of the most competitive nation-wide university entrance examination systems in the world (Bray & Kwok, 2003; Tansel & Bircan, 2006). Due to the large young population and the limited quota in higher education programs, a centralized University Entrance Examination has been conducted since 1964 (Dökmen, 1992; Tezbaşaran, 2004). In addition to shorter military service for male students and social prestige, students have a higher opportunity of finding a job with a university degree (Tansel & Bircan, 2006, 2008). Although the quotas have been increased in recent years, the number of applicants is still growing. For instance, while in 1974 there were only 229,906 applicants and 37,271 of them were admitted into higher education programs; in 2013, the number of applicants increased to 1,800,433 and 877,784 of them were placed in one the four-year undergraduate programs (Assessment, Selection and Placement Center [ÖSYM], 2013).

The content of the University Entrance Examination draws the attention of the teachers, parents and especially students whose future is believed to depend on their success at the University Entrance Examination. At this point, content validity of this assessment is crucial. The University Entrance Examination consists of two sections. The first section is designed to assess students' ability to use knowledge of basic concepts and principles within the framework of primary and high school curricula whereas the second section is designed to assess students' achievement related to high school curriculum objectives in different fields of study.

Although University Entrance Examination achievement is expected to be related with student's knowledge and academic skills, there are also other factors such as socioeconomic status (Sirin, 2005), interests (Schiefele, Krapp, & Winteler, 1992) and self-perception of competence (Shen, 2002; Shen & Pedulla, 2000), and instructional activities (Aypay, Erdoğan, & Sözer, 2007) that might have influence on the student's success.

Parental income, parent's education and occupation, and home resources are the main indicators of socioeconomic status (Sirin, 2005). In a number of studies, researchers demonstrated a positive relationship between socioeconomic status (SES) and achievement, which highlights the importance of SES (Alacacı & Erbaş, 2010; Caldas & Bankston, 1997; Coleman et al., 1966; Kalender & Berberoğlu, 2008; Köse, 2007; Ma & Klinger, 2000). Moreover, socioeconomic status has a determining impact on the student's participation to higher education in Turkey (Ekinci, 2011; Mıhçıoğlu, 1989). Besides, according to PISA 2003 National Report (EARGED, 2005), the socioeconomics status's ratio of explanation of variance in student's mathematics achievement is high in Turkey.

Interest has been recognized as an important affective factor that influences learning and academic achievement since Dewey (Dewey,1913) and it is still a significant predictor of achievement according to several recent studies (Lokan & Greenwood, 2000; Singh, Granville, & Dika, 2002; Ozel, Caglak, & Erdogan, 2013; Wigfield & Cambria, 2010).

Besides, perception of success is another affective factor that is related to academic achievement. Perception of success is considered as a key component of student's school related self-concept (Bong & Skaalvik, 2003). Various studies have shown that there is a positive relationship between achievement and self-concept of mathematics and science (Chiu & Xihua, 2008; Liu & Meng, 2010; Wilkins, 2004; Yoshino, 2012; Shen & Pedulla, 2000). While academic self-concept affects interest (Krapp 2000; Köller, Baumert & Schnabel, 2001); interest has a relatively small effect on self-concept (Marsh, Trautwein, Lüdtke, Köller, & Baumert, 2005). However, these studies do recognise that academic self-concept and interest are interrelated constructs.

In the literature, it is difficult to find a solid consistency in the relationship between the instructional activities and the mathematics-science student achievement. Some recent studies highlighted a positive relationship between teacher-centered activities and student achievement (Yayan & Berberoğlu, 2004); though, there are also some studies show that alternative teaching strategies are more effective than the traditional teaching strategies in science (Schroeder, Scott, Tolson, Huang, & Lee, 2007; Wise, 1996). In addition, many studies highlighted a negative relationship

between student-centered activities and student achievement in science and mathematics (Aypay et al. 2007; Kalender & Berberoğlu, 2000).

Although there are many other factors that could have been considered, the scope of this study is limited to the mentioned variables.

Method

Sample

The target population of this study is the total group of University Entrance Examination test takers who graduated from high schools in the last five years before 2008. Some 60,181 students of the population of 1,283,573 test takers responded to the Student Questionnaire on a volunteer basis. This study is based on the Student Questionnaire and the University Entrance Examination conducted by ÖSYM in 2008.

We recognize that this responder group does not represent the target population in terms of gender and school type. The number of male, Anatolian and science high school students who responded to the Student Questionnaire is higher than that of the target population. Therefore, a post-stratification method was used in order to make the students' distributions be similar to the target population. In 2008 University Entrance Examination, 56% of the target population is male and 44% of the target population is female. In addition, the percentage of target population students graduated from general high schools is 52%; from vocational high schools is 14%; from private high schools is 12%; from Anatolian high schools is 8%; and from science high schools is 0.4%; from the other types of high schools is %13.6.

A sample of 10,000 students was selected from the 60,181 students via post-stratification technique (Tabachnick & Fidell, 2001). We thus tried to deal with the problem of over and under-representativeness of gender and school type. The resulting sample now consists of 4413 female and 5587 male students. Thus, the constituted sample for the actual research analysis is deemed a representative sample of the target population in terms of gender and school type distributions. Distribution of student samples according to types of high schools is given at Table 1.

Table 1. Distribution of Students according to Types of High Schools

	Types of High Schools						
	General	**Anatolian**	**Science**	**Private**	**Vocational**	**Other**	**Total**
Number of students	5230	820	40	1330	1350	1230	10,000

Research Instruments

University Entrance Examination. The University Entrance Examination is a standardized test used for selection and placement to higher education in Turkey. It consists of two sections in which all subtests of the first section are expected to be responded by all students. Therefore, in this study, only the raw scores from the first section, which include Turkish language, social sciences, mathematics and science subtests, are examined. Each of these subtests contains 30 multiple-choice items with five alternatives. Using the standard guessing correction, the raw scores of each subtest are determined by subtracting one quarter of the number of incorrect answers from the number of correct answers (ÖSYM, 2008). The Turkish-social sciences raw scores (TSRS) are calculated by summing Turkish and social science raw scores. Similarly, mathematics-science raw scores (MSRS) are calculated by summing mathematics and science raw scores. The mean scores for the TSRS and MSRS are 33.42 and 18.10, respectively. The reliability coefficients (Cronbach's α) of the TSRS and MSRS are .97 and .93, respectively.

Student Questionnaire. The Student Questionnaire was developed by the Research and Development Department of ÖSYM. It is designed to gather information on social background characteristics, student affective characteristics and school related factors. These factors were selected

according to their relationship with academic achievement based on literature. A pilot study of the Student Questionnaire was performed in 2007. This version was revised using item and factor analyses. The 2008 version consisted of 77 items and its Cronbach's alpha reliability was found to be .88.

Analysis of Data

Data analysis consists of two phases. In the first phase, principal axis factor analysis is carried out on 30 items for a sample of 10,000 to determine the underlying constructs of the Student Questionnaire empirically. In the second phase, the factors scores obtained in the previous phase are used as the predictor variables for the multiple linear regression analysis. Two multiple regression analyses are separately used for the dependent variables of TSRS and MSRS. Statistical analyses are carried out using SPSS (2009) version 18.0 for Windows.

Results

Principal Axis Factor Analysis

Although the Student Questionnaire consists of 77 items, only 30 of them are used in the present study. The principal axis factor analysis with Varimax rotation is used to determine the main clusters of these items. Table 2 gives the rotated component matrix that shows the factor loadings of the items based on principal factors extraction. The zero-order correlation coefficients among the factors, having a maximum vaue of .17, are generally small values. These low correlation values show the employability of Varimax rotation, which assumes that there exists orthogonal factors.

Table 2. Factor Loadings of Student Questionnaire Items

Items	Factors				
	F1	**F2**	**F3**	**F4**	**F5**
Work on a project out of school time (MS)	**0.75**	0.17	0.02	-0.07	0.03
Students do presentation (MS)	**0.72**	0.13	0.02	-0.07	0.01
Group study in classroom (MS)	**0,64**	0,22	0,04	-0,08	0,10
ın a project out of school time (TS)	**0,59**	-0,03	0,03	0,11	0,02
Students do presentation (TS)	**0,55**	-0,07	0,05	0,12	0,08
Group study in classroom (TS)	**0,54**	-0,06	0,06	0,13	0,07
Check homework and project at classroom (MS)	**0,53**	0.09	-0.03	-0.03	0.36
Check homework and project at classroom (TS)	**0.47**	-0.08	-0.05	0.10	0.30
Perception of success in mathematics	0.03	**0.81**	0.06	-0.11	0.08
Interest in mathematics	0.02	**0.78**	0.04	-0.13	0.10
Perception of success in science	0.11	**0.75**	0.09	-0.15	-0.02
Interest in science	0.10	**0.74**	0.08	-0.17	0.00
Educational level of mother	-0.01	0.05	**0.69**	0.01	-0.02
Educational level of father	-0.02	0.10	**0.58**	0.00	-0.03
Own computer	0.00	-0.09	**0.53**	-0.08	0.12
Internet connection at home	-0.02	-0.11	**0.53**	-0.08	0.12
Number of siblings	0.03	0.00	**-0.50**	0.02	0.00
Own room	0.07	0.00	**0.47**	0.02	-0.01
Pre-school education period	0.01	0.06	**0.45**	0.00	-0.05
Own desk	0.08	0.06	**0.43**	0.03	0.00

Table 2. Continue

Items	Factors				
	F1	**F2**	**F3**	**F4**	**F5**
Number of books at home	0.01	0.12	**0.42**	0.15	0.03
Frequency of buying a daily newspaper	0.05	0.06	**0.39**	0.11	0.01
Perception of success in social sciences	0.05	-0.25	-0.05	**0.71**	-0.05
Interest in social scieneces	0.06	-0.10	0.00	**0.71**	-0.05
Perception of success in Turkish	0.05	-0.02	0.14	**0.65**	0.15
Interest in Turkish	0.06	-0.22	0.05	**0.64**	0.14
Copy notes from the board (MS)	0.09	0.18	0.04	-0.04	**0.75**
Teacher explains the course topic (MS)	0.11	0.20	0.09	-0.05	**0.74**
Teacher explains the course topic (TS)	0.11	-0.05	0.10	0.13	**0.46**
Copy notes from the board (TS)	0.12	-0.10	-0.08	0.08	**0.41**

Note: MS: Mathematics-science. TS: Turkish-social sciences.

Five major factors were extracted using principal axis factor analysis according to the factor loadings shown in Table 2. All factor loadings of items, having consistently higher than 0.40 values, are referred to as high or moderately high (Kline, 1994).

The identified five orthogonal factors appear to have remarkable content validities. Items related to student-centered instructional activities are loaded into Factor 1, which is called as student-centered instructional activities. Items related to students' perception of success and interest toward mathematics and science subjects are clustered in Factor 2, which is referred to as interest and perception of success in mathematics-science. Since the items in these two constructs, namely interest and perception of success, are loaded on the same factor, we can also conclude that these two constructs are related to each other. This result is similar to that of Kalender and Berberoğlu (2008). Items related to education level of parents and home resources related to education are loaded on Factor 3, which is defined as socioeconomic status (SES). Among the items loaded to SES factor, only the number of siblings has negative factor loading as expected (Gelbal, 2008). Factor 4, defined as interest and perception of success in Turkish-social sciences, clusters items related to interest and perception of success in Turkish and social sciences subjects, as in the case of Factor 2. Finally, Factor 5, called as teacher-centered instructional activities, consists of items related to teacher-centered instructional activities.

The items that construct Factor 1 and Factor 5 are obtained from the responses of students to the following two items in the Student Questionnaire.

"*How often the following activities (work on a project out of school time, students do presentation, group study in classroom, check homework and project at classroom, teacher explains the course topic, copy notes from the board) were used in Turkish and social sciences lessons at high school?"* The responses are rated on a frequency scale with the following alternatives of *Never, Once or twice in a term, Once or twice in a month, Once or twice in a week, Almost every day*.

"How often the following activities (work on a project out of school time, students do presentation, group study in classroom, check homework and project at classroom, teacher explains the course topic, copy notes from the board) were used in mathematics and science lessons at high school?" The responses are rated on a frequency scale with the following alternatives of *Never, Once or twice in a term, Once or twice in a month, Once or twice in a week, Almost every day*.

Factor 2 and Factor 4 are obtained from the responses of students to the following each two items in the Student Questionnaire:

"How much are you interested in each following subjects (Turkish, social sciences, mathematics and science)?" The responses are rated on a five-point scale with the alternatives of *Not at all, Very Little, Somewhat, Much, and Very much.*

"*How much do you feel that you are successful at the following subjects (Turkish, social sciences, mathematics and science)?"*. The responses are rated on a five-point scale with the alternatives of *Not at all, Very Little, Somewhat, Much, and Very much.*

The items related to Factor 3 and the corresponding alternatives for these items can be listed as below:

"What is your mother's education level?", "What is your father's education level?", Illetarate, Literate, Primary school degree, High school degree, University degree, Master degree and higher.

"How many siblings do you have?", None, 1, 2-3,4-6, 7 and more.

"How many books are there in your home excluding school books?", 0-10, 11-24, 25-100, 101-200, More than 200.

"Which of the following items do you have in your home?", Internet connection, Own computer, Own room, Own desk.

"How frequently does your family buy a newspaper?", Never, Sometimes, Everyday.

"How many years did you attend pre-school education?", None, 1 year, 2 years, 3 years, 4 years and more.

Table 3 shows factor names, number of items, reliabilities (Cronbah's α), eigenvalues, percentage of total variance explained by each factor and Pearson correlation coefficients of each factor with TSRS and MSRS.

Table 3. Student Questionnaire Factor Structure

Factors	No. of items	α	Eigenvalues	Explained variance%	TSRS *r*	MSRS *r*
F1. Student-centered instructional activities	8	.83	4.41	14.70	-.11*	-.05*
F2. Interest and perception of success in MS	4	.87	3.62	12.08	-.07*	.72*
F3. SES	10	.74	3.24	10.80	.10*	.13*
F4. Interest and perception of success in TS	4	.79	1.96	6.54	.38*	-.24*
F5. Teacher-centered instructional activities	4	.69	1.74	5.83	.04*	.03*

Note: MS: Mathematics-science. TS: Turkish-social sciences. * p<0.001.

According to Table 3, Cronbach's α values of factors vary between .69 and .87, which is an acceptable result for internal consistency (Field, 2013).

Multiple Regression Analysis

Two multiple regression analyses are employed to determine the contribution of each of the five factors to the variances of TSRS and MSRS separately. The factors are examined to ensure that there is not any violation for the assumptions of the regression models. Firstly, standardized residuals are examined to detect the availability of outliers. 46 out of 10,000 cases have absolute standardized residual values above 3. Since the sample size is very large and none of these cases have a Cook's distance of greater than 1, they do not have an undue influence on the regression model (Field, 2013). The assumptions for normality, linearity and homoscedasticity of residuals are tested. Therefore, the standardized residuals are used to examine whether residuals are normally distributed about the predicted University Entrance Examination scores. The residuals have straight-line relationship with predicted scores and the variances of residuals are the same for all predicted scores. Consequently, the results show that residuals are normally distributed and have linear relationships with predicted scores (Tabachnick and Fidell, 2007). The assumptions of multicollinearity and independence of residuals are also checked. The Variance Inflation Values (VIF) change between 1.001 and 1.008 and zero-order correlations' among the factors are less than .17, showing that multicollinearity is not an

issue (Field, 2013). The Durbin Watson statistics are also 1.77 and 1.81 for TSRS and MSRS, respectively, which implies that residuals are independent.

Independent variables, which are student-centered instructional activities, interest and perception of success in mathematics-science, SES, interest and perception of success in Turkish-social sciences and teacher-centered instructional activities enter into the regression equation simultaneously by using their factor scores. Factor scores are determined by principal axis factor analyses and these scores are defined as the z scores with the 0 mean and standard deviation of 1. Table 4 displays estiamtes of multiple regression analysis for TSRS and MSRS. The unstandardized regression coefficients (*B*), standard errors of B (*SEB*), and the standardized regression coefficients (β) are given in Table 4.

Table 4. Summary of Multiple Regression Analysis Results (N=10,000)

	TSRS			MSRS		
Factors	*B*	*SEB*	β	*B*	*SEB*	β
Constant	33.42	.11		18.10	.10	
F1. Student-centered instructional activities	-1.56	.12	-.12*	-1.18	.11	-.07*
F2. Interest and perception of success in MS	-0.50	.12	-.04*	11.74	.11	.71*
F3. SES	1.23	.12	.09*	2.04	.11	.12*
F4. Interest and perception of success in TS	5.13	.12	.38*	-3.16	.12	-.18*
F5. Teacher-centered instructional activities	0.59	.12	.04*	0.18	.15	.01

Note: MS: Mathematics-science. TS: Turkish-social sciences. R^2=0.17 for TSRS and R^2=0.57 for MSRS. *p<0.01.

Multiple regression analysis shows that the linear combination of factors is significantly related to TSRS achievement (R^2 =.17; F(5, 9994)=418, p<.001). The R^2 value of .17 indicates that only 17% of the variability in TSRS is predicted by five factors. As given in Table 4, the relative order of importance of the predictive variables on the TSRS based on the standardized regression coefficients are interest and perception of success in Turkish-social sciences, student-centered instructional activities, SES, interest and perception of success in matehematics-science, and teacher-centered instructional activities. Interest and perception of success in Turkish-social sciences, SES and teacher-centered instructional activities have significant positive regression whereas interest and perception of success in mathematics-science, and student-centered instructional activities factors have significant negative regression weights for TSRS.

Multiple regression analysis also shows that the linear combination of factors are significantly related to MSRS achievement (R^2 =.57; F(5, 9994)= 2653, p<.001). The five factors account for 57% of the total variation in MSRS achievement. The relative order of importance of the predictive variables on the MSRS based on the standardized regression coefficients are interest and perception of success in mathematics-science, interest and perception of success in Turkish-social sciences, SES, , and student-centered instructional activities. Interest and perception of success in mathematics-science and SES have significant positive regression weights, whereas student-centered instructional activities and interest and perception of success in Turkish-social sciences factors have negative regression weights. Teacher-centered instructional activities do not contribute significantly to variations in MSRS achievement.

Discussion and Conclusion

In this study, by utilizing the Student Questionnaire conducted in 2008, the relationship between the University Entrance Examination achievement and the determined factors, which are interest and perception of success in Turkish-social sciences, interest and perception of success in mathematics-science, student-centered activities, teacher-centered activities, and socioeconomic status (SES), are examined by using multiple regression analysis. According to the results, interest and perception of success in Turkish-social sciences, and interest and perception of success in mathematics-science factors are found to be the most important factors predicting TSRS and MSRS, respectively. It is also observed that there is a significant negative relationship between interest and perception of success in Turkish-social sciences and MSRS as well as between interest and perception of success in mathematics-science and TSRS. Besides, student-centered instructional activities have a negative relationship not only with TSRS but also with MSRS; whereas, even though the effect size is small, teacher-centered activities have a positive relationship only with TSRS. Finally, as it is expected, SES has a positive relationship with both raw scores.

Students reporting more interest in Turkish and social sciences and higher perception of success about these subjects are more likely to have a higher TSRS. A similar relationship also exists in mathematics and science subjects and their corresponding raw scores. These results are consistent with studies that examine relationship between achievement and interest (Doğan & Barış, 2010; Renninger & Hidi, 2002) and achievement and self-concept (Berberoğlu, 2007; Marsh & Yeung, 1997; Möller, Pohlmann, Köller, & Marsh, 2009).

Students reporting more interest in Turkish-social sciences and higher perception of success about these subjects are more likely to have a lower MSRS. A similar relation also exists between interest and perception of success in mathematics-science and TSRS. Even if the effect size is small, students reporting more interest in mathematics-science and higher perception of success about these subjects are more likely to have a lower TSRS. These results are consistent with the results about relationships among verbal self-concept, mathematics self-concept, verbal achievement and mathematics achievement (Chiu, 2008; Marsh, 1986; Möller et al., 2009). This result can be explained as the student's tending to answer the corresponding items that they have more interest and high perception of success at the beginning of the University Entrance Examination so that they could respond to items belonging to the other subjects if only they had enough remaining time.

This study also provides crucial information about the relationship between instructional activities and University Entrance Examination achievement. Turkey has made major improvements in its educational system and changed high school curricula to employ more student-centered activities rather than teacher-centered activities in recent years (Ministry of National Education, 2004). Students reporting that their teachers use frequently student-centered instructioanl activities tend to have lower TSRS and MSRS. On the other hand, students have higher TSRS if they report that their teachers use frequently teacher-centered instructional activities. These results are consistent with the literature (Aypay et al., 2007; Ceylan & Berberoğlu, 2007; Kalender & Berberoğlu, 2008; Sousa, Park & Armor, 2012; Yayan & Berberoğlu, 2004). Since the University Entrance Examination is a multiple choice standardized test, it may not be sufficient to assess students' skills and competence to be acquired by student-centered instructional activities. Furthermore, many of the teachers are accustomed to use teacher-centered instructional activities whereas some are not sure how to implement student-centered instructional activities appropriately (Işikoglu, Basturk, & Karaca, 2009). Therefore, student-centered instructional activities may not be properly implemented in the schools, as it is supposed to be.

Finally, as expected SES is positively associated with both MSRS and TSRS. There are many theoretical and experimental studies showing a positive relationship between SES and academic achievement (EARGED, 2005; OECD, 2004; Zwick & Green, 2007). Morever, Tomul and Polat (2013) also showed a positive relationship between family's SES and students University Entrance Examination scores. In Turkey, categorizing students according to their academic success by a High School Entrance Examination allows the socioeconomically advantageous students having chance to take a better education at high school level. Thus, the impact of SES on the University Entrance Examination achievement increases.

According to these results, more attention should be paid to increase students' interest and perception of success in core subjects since this factor is the most salient predictor of the University Entrance Examination achievement. Besides, it is important that teachers should perform some activities to increase the student's interest to the subjects and give feedback to the students about their success and improvement. Giving feedback about what students can achieve or have difficulty to do should help students to have more accurate perception while evaluating their success rather than only giving marks to the students.

Acknowledgement

I would like to thank Research and Development Department of ÖSYM for their support and Prof. Dr. Giray Berberoğlu for his valuable comments.

References

Alacacı, C., & Erbaş, A. K. (2010). Unpacking the inequality among Turkish schools: Findings from PISA 2006. *International Journal of Educational Development*, *30*(2), 182-192.

Aypay, A., Erdoğan, M., & Sözer, M. A. (2007). Variation among schools on classroom practices in science based on TIMSS-1999 in Turkey. *Journal of Research in Science Teaching, 44*, 1417-1435. doi:10.1002/tea.20202

Baird, J., Isaacs, T., Johnson, S., Stobart, G., Yu, G., Sprague, T., & Daugherty, R. (2011). *Policy effects of PISA.* Oxford University Centre for Educational Assessment.

Berberoğlu, G. (2007). Türk bakış açısından PISA araştırma sonuçları. Konrad Adenauer Stiftung.

Bong, M., & Skaalvik, E. M. (2003). Academic self-concept and self-efficacy: How different are they really? *Educational Psychology Review*, *15*(1), 1-40.

Bray, M., & Kwok, P. (2003). Demand for private supplementary tutoring: Conceptual considerations and socio-economic patterns in Hong Kong. *Economics of Education Review*, *22*, 611-620.

Caldas, S. J., & Bankston, C. III (1997). Effect of school population socioeconomic status on individual academic achievement. *Journal of Educational Research*, *90*, 269-277.

Ceylan, E., & Berberoğlu, G. (2007). Factors Related With Students' Science Achievement: A Modeling Study. *Education and Science, 32*(144), 36-48.

Chiu, M. S. (2008). Achievements and self-concepts in a comparison of math and science: exploring the internal/external frame of reference model across 28 countries. *Educational Research and Evaluation*, *14*(3), 235-254.

Chiu, M. M., & Xihua, Z. (2008). Family and motivation effects on mathematics achievement: Analyses of students in 41 countries. *Learning and Instruction, 18*, 321-336. doi:110.1016/j.learningstruc.2007.06.003

Coleman, J. S., Campbell, E., Hobson, C., McPartland, J., Mood, A., Weinfeld, F., & York, R. (1966). *Equality of educational opportunity.* Department of Health, Education and Welfare, Washington, DC.

Davis-Kean, P. E. (2005). The influence of parent education and family income on child achievement: the indirect role of parental expectations and the home environment. *Journal of Family Psychology, 19*(2), 294-304.

Dewey, J. (1913). *Interest and effort in education*. The Riverside Press, Cambridge, MA.

Doğan, N., & Barış, F. (2010). Tutum, değer ve özyeterlik değişkenlerinin TIMSS-1999 ve TIMSS-2007 sınavlarında öğrencilerin matematik başarılarını yordama düzeyleri. *Eğitimde ve Psikolojide Ölçme ve Değerlendirme Dergisi, 1*(1), 44-50.

Dökmen, Ü. (1992). *T.C. Yükseköğretim Kurulu Öğrenci Seçme ve Yerleştirme Merkezi, kuruluşu, gelişmesi, çalişmasi*. Ankara: ÖSYM Yayınları.

EARGED (2005). *PISA 2003 Projesi Ulusal Nihai Rapor*. Ankara: Milli Eğitim Basımevi.

Ekinci, C. E. (2011). Impact of some socio-economic factors on higher education participation in Turkey. *Education and Science*, *36*(160), 281-297.

Field, A. (2013). *Discovering statistics using IBM SPSS statistics*. (4th ed.) SAGE Publications.

Gelbal, S. (2008). Sekizinci sınıf öğrencilerinin sosyoekonomik özelliklerinin Türkçe başarısı üzerinde etkisi. *Eğitim ve Bilim*, *33*(150), 1-13.

Isikoglu, N., Basturk, R., & Karaca, F. (2009). Assessing in-service teachers' instructional beliefs about student-centered education: A Turkish perspective. *Teaching and Teacher Education*, *25*(2), 350-356.

Kalender, İ., & Berberoğlu, G. (2008). An assessment of factors related to science achievement of Turkish students'. *International Journal of Science Education, 1-16.*

Kline, P. (1994). *An easy guide to factor analysis*. Routledege, London.

Köller, O., Baumert, J., & Schnabel, K. (2001). Does interest matter? The relationship between academic interest and achievement in mathematics. *Journal for Research in Mathematics Education*, 448-470.

Köse, R. (2007). Aile sosyoekonomik ve demografik özellikleri ile okul ve özel dershanenin lise giriş sınavına katılan öğrencilerin akademik başarıları üzerindeki etkileri. *Eğitim, Bilim, Toplum, 5*(17), 46-77.

Krapp, A. (2000). Interest and human development during adolescence: An educational-psychological approach. *Advances in Psychology, 131*, 109-128.

Liu, S., & Meng, L. (2010). Re-examining factor structure of the attitudinal items from TIMSS 2003 in cross-cultural study of mathematics self-concept. *Educational Psychology: An International Journal of Experimental Educational Psychology, 30*(6), 699-712.

Lokan, J., & Greenwood, L. (2000). Mathematics achievement at lower secondary level in Australia. *Studies in Educational Evaluation*, 26, 9-26.

Ma, X., & Klinger, D. A. (2000). Hierarchical linear modeling of student and school effects on academic achievement. *Canadian Journal of Education*, *24*, 41-55.

Marsh, H. W. (1986). Verbal and math self-concepts: An internal/external frame of reference model. *American Educational Research Journal, 23(*1), 129-149.

Marsh, H. W., Trautwein, U., Lüdtke, O., Köller, O., & Baumert, J. (2005). Academic self-concept, interest, grades, and standardized test scores: reciprocal effects models of causal ordering. *Child Development*, *76*(2), 397-416.

Marsh, H. W., & Yeung, A. S. (1997). Causal effects of academic self-concept on academic achievement: Structural equation models of longitudinal data. *Journal of Educational Psychology*, *89*(1), 41.

Martins, L., & Veiga, P. (2010). Do inequalities in parents' education play an important role in PISA students' mathematics achievement test score disparities? *Economics of Education Review*, *29*(6), 1016-1033.

Mıhçıoğlu, C. (1989). *Eğitimde yörelerarası dengesizliğin neresindeyiz?* Ankara: ÖSYM Yayınları.

Ministry of National Education, (2004). *Talim ve Terbiye Kurulu Başkanlığı program geliştirme çalışmaları.* Retrieved from http://programlar.meb.gov.tr/index/giris_index.htm

Möller, J., Pohlmann, B., Köller, O., & Marsh, H. W. (2009). A meta-analytic path analysis of the internal/external frame of reference model of academic achievement and academic self-concept. *Review of Educational Research*, *79*(3), 1129-1167.

Organization for Economic Cooperation and Development (OECD). (2004). Learning from tomorrows' world. First results from PISA 2003.

Ozel, M., Caglak, S., & Erdogan, M. (2013). Are affective factors a good predictor of science achievement? Examining the role of affective factors based on PISA 2006. *Learning and Individual Differences, 24*, 73-82.

Ölçme Seçme ve Yerleştirme Merkezi (ÖSYM). (2008). *Öğrenci Seçme ve Yerleştirme Sistemi (ÖSYS) Kılavuzu,* [Student Selection Placement System Guide]. Ankara: ÖSYM Yayınları.

Ölçme Seçme ve Yerleştirme Merkezi (ÖSYM). (2013). Retrived from 21 August 2013, http://osym.gov.tr/belge/1-10386 /2008-ogrenci-secme-ve-yerlestirme-sistemi-osys-2008-osy-.html

Parry, J., Mathers, J., Stevens, A., Parsons, A., Lilford, R., Spurgeon, P., & Thomas, H. (2006). Admissions processes for five year medical courses at English schools: review. *Bmj*, *332*(7548), 1005-1009.

Renninger. K. A, & Hidi, S. (2002). *Student interest and achievement: Developmental issues raised by a case study.* In A. Wigfield, J. S. Eccles (Eds.), *Development of achievement motivation*. Academic Press, San Diego.

Schiefele, U., Krapp A., & Winteler, A. (1992). *The role of interest in learning and development.* K. A. Renninger, S. Hidi & A. Krapp (Eds.), Hillsdale, NJ: Erlbaum.

Schroeder, C. M., Scott, T. P., Tolson, H., Huang, T. Y., & Lee, Y. H. (2007). A meta-analysis of national research: Effects of teaching strategies on student achievement in science in the United States. *Journal of Research in Science Teaching*, *44*, 1436-1460. doi:10.1002/tea.20212

Shen, C. (2002). Revisiting the relationship between students' achievement and their self-perceptions: A cross-national analysis based on TIMSS 1999 data. *Assessment in Education: Principles, Policy & Practice*, *9*(2), 161-184.

Shen, C., & Pedulla, J. J. (2000) The relationship between students' achievement and their self-concept of competence and rigour of mathematics and science: A cross-national analysis. *Assessment in Education*, *7*(2), 237-253.

Singh, K., Granville, M., & Dika, S. (2002). Mathematics and science achievement: Effects of motivation, interest, and academic engagement. *The Journal of Educational Research, 95*(6), 323-332.

Sirin, S. R. (2005). Socioeconomic status and academic achievement: A meta-analytic review of research. *Review of Educational Research, 75*(3), 417-453.

Sousa, S., Park, E. J., & Armor, D. J. (2012). Comparing effects of family and school factors on cross-national academic achievement using the 2009 and 2006 PISA surveys. *Journal of Comparative Policy Analysis: Research and Practice*, *14*(5), 449-468.

SPSS (2009). PASW Statistics for Windows, Version 18.0. Chicago: SPSS Inc.

Tabachnick, B. G., & Fidell, L. S. (2007). *Using multivariate statistics* (5th ed.). Pearson Education.

Tabachnick, B. G., & Fidell, L. S. (2001). *Using multivariate statistics* (4th ed.). NY: Allyn & Bacon.

Tansel, A., & Bircan, F. (2008). *Private supplementary tutoring in Turkey recent evidence on its various aspects.* Working Paper 451, Economic Research Forum.

Tansel, A., & Bircan, F. (2006). Demand for education in Turkey: A tobit analysis of private tutoring expenditures. *Economics of Education Review*, *25*(4), 303-313.

Tezbaşaran, A. (2004). Yükseköğretime geçişin kısa öyküsü ve öğrenci seçme ve yerleştirme sistemindeki değişmeler (1960-2004). *Eğitim Bilim Toplum Dergisi*, *2*(6), 108-112.

Tomul, E., & Polat, G. (2013). The effects of socioeconomic characteristics of students on their academic achievement in higher education. *American Journal of Educational Research*, *1*(10), 449-455.

Yayan, B., & Berberoğlu, G. (2004). A Re-analysis of the TIMSS 1999 mathematics assessment of the Turkish students. *Studies in Educational Evaluation*, *30*, 87-104.

Wigfield A., & Cambria, J. (2010). Students' achievement values, goal orientations, and interest: Definitions, development, and relations to achievement outcomes. *Developmental Review*, *30*(1), 1-35.

Wilkins, J. L. (2004). Mathematics and science self-concept: An international investigation. *The Journal of Experimental Education, 72*(4), 331-346.

Wise, K. C. (1996). Strategies for teaching science: What works? *Clearing House*, *69*, 337-338.

Yoshino, A. (2012). The relationship between self-concept and achievement in TIMSS 2007: A comparison between American and Japanese students. *International Review of Education*, *58*(2), 199-219.

Zwick, R., & Green, J. (2007). New perspectives on the correlation of SAT scores, high school grades, and socioeconomic factors. *Journal of Educational Measurement*, *44*(1), 23-45.