Factors That Affect Mathematics-Science (MS) Scores in the Secondary Education Institutional Exam: An Application of Structural Equation Modeling

*Mustafa YAVUZ**

Abstract

Discovering what determines students' success in the Secondary Education Institutional Exam is very important to parents and it is also critical for students, teachers, directors, and researchers. Research was carried out by studying the related literature and structural equation modeling techniques. A structural model was created that consisted of students' mathematics and science scores used by the College of Science Schools in addition to family income, attendance at private test preparatory courses, and parents' educational levels. The study's population consisted of 23,895 students who took the Secondary Education Institutional Exam in Konya/Turkey. The study sample consisted of 310 randomly selected students from the study population. The results show that parents' educational levels have a direct effect, and that increased incomes due to both the father's educational level and a preparatory course attendance have indirect effects on mathematics-science scores.

Key Words

Structural Equation Model, Characteristics of Students, Achievement Examinations.

**Correspondence:* Assist. Prof. Dr. Mustafa YAVUZ, Selcuk University, Faculty of Ahmet Keleşoğlu Education 42090 Konya/TURKEY.
E-mail: mustafaya2002@hotmail.com, mustafayavuz@selcuk.edu.tr

Kuram ve Uygulamada Eğitim Bilimleri / Educational Sciences: Theory & Practice
9 (3) • Summer 2009 • 1557-1572

Following compulsory elementary education lasting eight years, about 84% of students continue their education in high schools. Students take the Secondary Education Institutional Exam (OKS) and then attend various selective schools based on their exam scores. Students who do not score high enough attend other high schools which do not require any exam score and open to everyone. The Secondary Education Institutional Exam has been very important for students and their parents because students attending such open admission schools have little chance of passing the University Entrance Exam which they take after finishing high schools. When the Secondary Education Institutional Exam scores are computed, the number of correct and incorrect answers on each test is counted. One correct answer is canceled for every three incorrect answers. In this way, for every subsection of the test, the candidates' net scores are computed. These net scores are made into two different standard scores of mathematics-Turkish and mathematics-science scores, which are computed by multiplying one standard point with three Turkish, four standard point for mathematics, and four standard point for science and social science net scores (Millî Eğitim Bakanlığı [MEB], 2008a). After the last administration of the Secondary Education Institutional Exam in 2008, high-school attendance will be determined by a three-stage exam of 6th, 7th, and 8th graders that assesses the students' academic success and social maturity.

Given these, Table 1, high schools accepting students based on their exam scores had a quota of 258,600 students in 2008. In total, there were 1,175,574 students attending 8th grade; 527,346 took the Secondary Education Institutional Exam (Millî Eğitim Bakanlığı [MEB], 2008b). Around half (49%) of the students who

Table 1.
Enrollment for schools registering students based on exam scores, 2008-2009

School	Quota of students
College of Science Schools	6,432
Anatolian High Schools	110,260
Schools of Social Sciences	960
Technical Education Schools for Boys	33,230
Technical Education Schools for Girls	19,550
Tourism and Commercial Educational Schools	25,410

↳

Teacher Training and Educational Schools	17,700
Religion Training Schools	18,030
Private Schools	11,230
Health Services Schools	15,888
Total	258,600

took the exam had an opportunity to attend selective high schools. Parents and students consider it very important to be among the 49% accepted by selective high schools, mostly College of Science Schools and Anatolian High Schools, which are more successful than the other non-selective schools in preparing students for the University Entrance Exam. Understanding the variables that affect students' academic achievement is critical. There has been much research on the correlation of academic achievement and parenting styles, socio-economic status, teacher aids, types of schools, perception of personal control, efficiency of principals**,** gender and locus of control (Attaway & Bray, 2004; Bain & Boersma, 1983; Carpenter, 1985; Gentilucci, 2007; Gerber & Fin, 2001; Goddard, Sweetland & Hoy, 2000; Kelly, 1993; Steinberg, Lamborn, Darling, Mounts, & Dornbusch, 1994; Stipek, 1981). However, among such variables supposed to affect academic achievement in Turkey, parents and students assume private exam preparation courses to be one of the most supportive resources outside of the school in order to achieve success in the exam.

Hence, while there were 433,847 students in 1,664 private test preparatory courses in 1997, according to data from the Turkish Ministry of Education, there will be 1,071,827 students and 47,621 teachers in 3,896 private courses within the next 10 years (MEB, 2007). Research has pointed out that students give priority to such private courses while studying for exams (Kelecioğlu, 2002; Turan & Alaz, 2007) and that students attending these private courses have a more positive attitude than those who cannot attend (Karaer, 2007).

While the Turkish Ministry of Education abolishes the exam, they are planning to carry out the Primary Education Program by adapting a new secondary education school system to take over learning at school and to decrease the tendency to use private courses. It has been thought that private courses are one of the most important resources outside of schools, and for that reason, it has been considered important to determine how effective such institutions in the achievement of students.

Attending private courses is not the only variable that affects student achievement. Results of other research have pointed out that the educational levels of parents affect the achievement level of students as well. According to Yazıcı (2002), for instance, the more highly educated the mother is, the more the child matures in school, starting from preschool. Much research states that students study efficiently if the mother is well educated (e.g., Bilgin, 1990; Carneiro, 2008; Kotaman, 2008; Yenilmez & Duman, 2008). The correlation between the father's education and the student's academic achievement is also positive (Cabrera, Shannon, & LeMonda, 2007; Kotaman, 2008; Smith, Atkins, & Connell, 2003; Yazıcı, 2002). However, research results have some variance across different cultures. For instance, according to research conducted in Japan, highly educated mothers influence their daughters' academic achievement, but not their sons' (Campell & Uto, 2002). The same research has shown that educated fathers improve their children's academic achievement. In conclusion, the academic achievement of students who have highly educated parents is higher than those who do not (Gross, Mettelman, Dye, & Slagle, 2002).

Another variable affecting achievement on exams is family income. Research by Carneiro (2008) and Yenilmez and Duman (2008) has pointed out that the level of income has a positive effect on academic achievement. However, according to Davis-Kean (2005), parental income does not directly affect academic achievement, but affects the beliefs and attitudes of the family.

When other variables in this study are taken together, academic achievement is positively correlated. For instance, students from families with low incomes and low levels of education have lower academic achievement (Bandura, Barbaranelli, Caprara, & Pastorelli, 1996).

Attendance in private exam preparation courses is an extra expenditure for parents as well as children. According to the research carried out by Carreiro (2008), one more year of education increases income by a proportion of 7%. Thus, it can be supposed that children whose parents have higher income because of their high educational levels attend private courses more frequently than those with parents with lower educational level and income. However, in such occasions, we can conclude that the significance of achievement in the OKS is naturally related to the educational level of the family, in addition to the high income. Such conditions may cause to violate the equal opportunity in edu-

cation. For that reason, it has been thought that research studying the educational and income levels of the family, together with the position of students attending private courses and Mathematics -Science points of students, will be needed. In this study, to the intention is to determine the effect of the variables, if any, studied within the research, on the mathematics–science points in the OKS. It has been assumed that revealing predictors of student success in the Secondary Education Institutional Exam, which is very important to parents, will also be advantageous for students, teachers, directors, and researchers. Hence, the research on mathematics-science scores has been explored by studying the related literature. _

Hypotheses

Figure 1 presents the model reflecting the related literature and research that show the direct correlation between observed variables with the mother's educational level and attending private test preparatory courses with mathematics-science scores.

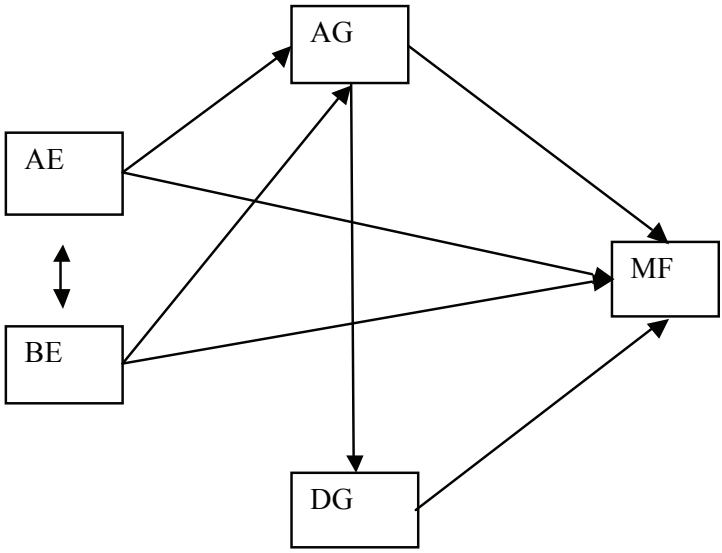

Figure 1. *The research model for studying direct and indirect correlations of observed variables*

Abbreviations:

AE: Mother's education

BE: Father's education

AG: Family income

DG: Attending private courses

MF: Mathematics-science score on the Secondary Education Institutional Exam in 2008

According to the model, the hypotheses of the study are as follows.

1- Mother's educational level has a direct effect on mathematics-science scores.

2- Mother's educational level has a positive effect on mathematics-science scores by increasing family income.

3- Mother's educational level has a positive effect on mathematics-science scores by increasing both family income and course attendance.

4- Father's educational level has a direct influence on mathematics-science scores.

5- Father's educational level has a positive effect on mathematics-science scores by increasing family income.

6- Father's educational level has a positive effect on mathematics-science scores by increasing both family income and course attendance.

Method

Population and sample

The required sample size differs according to the purpose of the research and current restrictive factors. One of these factors is the appointment of the sample size according to the former stable sampling proportion (Arıkan, 2004). For this purpose, it was the intention that the universe should reach 1% by taking into account the n/N proportion in the research. In this research, 1% of the population is nearly 239 people. More students were reached than this number in the research. The sample of

the research consists of 310 students who were selected by simple random sampling method. By means of the personal information form, some information belonging to the students in the sample group was obtained such as parents' education levels, family's monthly income level and the position of students attending the private test preparatory courses. Mathematics-science (MF) and mathematics-Turkish (MT) scores from the Secondary Education Institutional Exam have been obtained from schools and preparatory courses. Since there is a high correlation of 97% between MT and MF scores, the MF scores, essential for the College of Science Schools, have been used for the model in this study.

Analysis of the data

The structural equation model (SEM) is a widely used statistical approach. It is a combination of factor analysis and multiple regressions and is used for testing models of correlations between implied and observed variables (Byrne, 2001; Hair, Anderson, Tatham, & Black, 1998; Hoyle, 1995). The most basic characteristics of SEM are based on theory. Its main aim is to state explicitly whether the correlation pattern previously identified is confirmed by the data (Yener, 2007). Thus, SEM has been developed to make clear the variables that are the determinants of mathematics-science scores, and the direct correlation of observed variables AE, BE, AG, DG, and MF from the related literature. Lisrel 8.51 and SPSS 14.0 were used to analyze the data.

Results

Demographic features of the students enrolled for the Secondary Education Institutional Exam are shown in Table 2, including the research sample.

Table 2.
Sample profile

Sample Characteristics	N (number of persons)	Percentage (%)
Mother's education (AE)		
Primary school	124	40.00
Secondary school	40	12.90
High school	64	20.64

↳

University (Assoc. and License Degree)	70	22.58
Master's of Arts and Doctoral	12	3.87
Father's education (BE)		
Primary school	63	20.32
Secondary school	38	12.25
High school	62	20.00
University (Assoc. and License Degree)	121	39.02
Master's of Arts and Doctoral	26	8.38
Family income (AG)		
0–400 NTL(New Turkish Lira*)	16	5.16
401–800 NTL	55	17.74
801–1200 NTL	78	25.16
1201–1600 NTL	53	17.09
1601- 2000 NTL	49	15.80
2001 NTL or more	59	19.03
Years of attending private test prep courses (DG)		
Never attendance	21	6.77
1 year	84	27.09
2 years	78	25.16
3 years	73	23.54
4 years or more	54	17.41

*1 NTL= $ 0.66

Evaluating the fit of the model

In this study, the second and third hypotheses, inconsistent with the model, and have therefore been removed from the model. The adaptation value of the new model has been found to be: chi-square $\chi^2 = 9.35$; degrees of freedom df = 4; goodness of fit index (GFI) = 0.98; normed fit index (NFI) = 0.97; and root mean square error of approximation (RMSEA) = 0.090.

Also, with the value of RMSEA between 0.05 and 0.10 and χ^2 / df = 2.33, the model is consistent with regard to the fit value (Cheng, 2001; Kelloway, 1998; Pank, 1996).

Figure 2 shows that there are standardized parameter values among the observed variables of AE, BE, AG, DG, and MF.

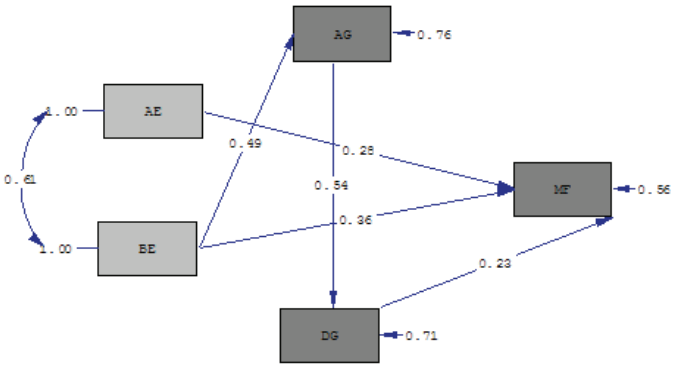

Figure 2. *Standardized parameter values about the model*

The highest parameter values are 0.61 for AG-DG, then 0.54 for AG-DG, and then 0.49 for BE-AG. Such parameter values are important for each variable, and the higher the parameter values, the greater the correlation with each other.

In Figure 3, t-values among the variables are shown.

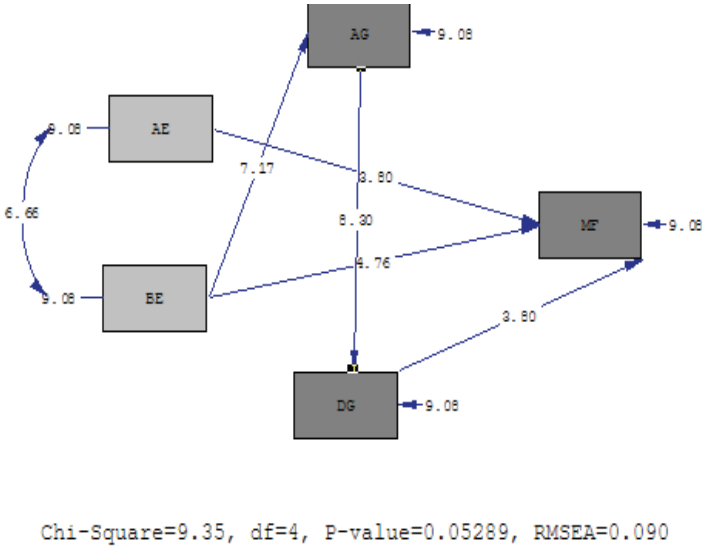

Figure 3. *Values of the variables*

To be acceptable for a correlation of 0.5, the critical t-value is 1.96 (Şimşek, 2007). In this respect, it has been shown that correlations between all the variables in Figure 3 are significant.

According to the model, AE has a direct positive effect on mathematics-science scores (t = 3.80), supporting hypothesis 1. It has been concluded that AE-AG does not increase MF scores, thus, hypothesis 2 has been omitted from the model's original plan. Similarly, hypothesis 3 has been deleted and omitted from the model because AE does not affect mathematics-science scores by means of AF-DG variables. BE affects MF scores by affecting directly (t = 4.76) income (t = 07.17) and attendance at private courses (t = 8.30). In other words, the better educated the father, the higher the family income will be, and so the greater the course attendance will be; that is to say, mathematics-science scores will be higher. These results support hypotheses 4 and 6. However, hypothesis 5 has been deleted and omitted from the model, as BE does not make mathematics-science scores higher by affecting AG.

Discussion

This study shows that the educational levels of both parents are significant for higher MF scores. These findings are similar to those of other studies (e.g., Bilgin, 1990; Carneiro, 2008; Kotaman, 2008; Yenilmez & Duman, 2008). While the present study shows the importance of educational level, it also highlights a vicious cycle of academic under-achievement for students with uneducated parents. According to the Turkish Statistics Organization-TUIK (Türkiye İstatistik Kurumu, 2008), 697,213 males and 730,787 females of 15 years of age and above that make 1,428,000 people living in Konya which is the population of the research. 636,522 (44.57%) people were educated at the primary level from the total population of 291,115 (20.39 %) males and 345,407 (24.18 %) females. This situation is not different in other parts of Turkey. According to the TUIK (2008), 34.34 % of people aged 15 years and above are graduates of primary school. Especially, children in the age of education of these people which are nearly half of the population of Konya that make 1/3th of the population in Turkey make the most disadvantaged group. However, one of the possible functions of society is social action. In primitive societies, as children were educated by their

parents, they had no choice but to follow the paternal profession. Moreover, there were not many jobs and occupations furthering social evolution. Social mobility has grown with industrial society (Fidan & Erden, 1998). Vertical social evolution is radical revolution. Education affects the system of current classification in the society, and it also lessens the distance between classes by affecting the speed of socio-economic evolution (Tezcan, 1997). When education is assumed to be a means of achieving social evolution, common exams can be an especially important barrier to vertical social evolution for students whose parents are poorly educated.

According to the results reported in this research, the rise in BE increases AG but AE does not affect AG, because mothers do not have a professional job, although some of them are well educated. The correlation between education and income has been especially supported by research results. This research has pointed out that one more year of education increases the employment ratio by 1% and increases income by 7% (Carneiro, 2008). Education increases human productivity by creating value for intelligence, just as investment in a new machine increases the productivity of capital stock (Woodwall et al., 1994).

The other striking result of the study is that AG does not affect either AE-MF or BE-MF. In the literature, there exists a considerable body of results showing that monthly income level of the family affects students' achievement levels positively (e.g., Caldos, 1995; Sirin, 2005; Uzun & Sağlam, 2005; Yuksel & Sezgin, 2008). Other research has shown the relationship between family's income level and academic achievement while there are other results that show that this relationship is low or non-existent. For example, in the meta-analysis by White (1982), in which 200 studies were evaluated, it was found out that there was a very low relationship between income and academic achievement. Although some research shows a relationship between income and academic achievement, it can be stated that academic achievement increases in proportion to amount of income spent on education and instruction in this context. For this purpose, it is thought to be fundamental that other research that states the other variables between monthly income and academic achievement in regard of researches which put forth the relationship between monthly incomes level of the family and student's academic achievement level directly. For instance, according to the results of this study, the higher the father's edu-

cation, the higher the income will be, and the longer attendance of courses will be, resulting in a higher mathematics-science score. According to a report published by the United Nations Development Program (Birleşmiş Milletler Kalkınma Programı, 2008), children of parents from low income are faced with a striking inequality by reaching education in Turkey. As education and health expenses create a third of total expenditure of family members, this, as a result, prevents children from families with low income from opportunities to be gained from education. These expenses to schools and private test preparatory courses, which constitute half of the income level of family members, reach a level that no-one can compensate these from six young people whose families live in great poverty.

In conclusion, this study has shown that the monthly income level of the family played a role in the raise of students' mathematics–science scores. In this context, family's income affects students' examination scores and causes other results.

Although there has been no research showing that course attendance increases mathematics-science scores, research has indicated that students emphasize the importance of private test preparatory courses in studying for exams (Kelecioğlu, 2002; Turan & Alaz, 2007) and also that students attending such courses have a more positive attitude (Karaer, 2007).

According to Article 8 in Law No. 1739 of the Turkish Ministry of Education's Basic Law, "women and men have equal opportunity in education. Boarding-school fees, scholarships, credit, and other benevolence can be enabled to make the poor but successful students go on to higher education" (Resmi Gazete, 1973). The correlation between attending courses and MF scores is considered a significant barrier towards achieving this equal opportunity. The study proves that higher income increases course attendance, which also increases MF scores. Because of this, there have been negative effects on the academic achievement of the children of parents with low incomes. AE and BE are important determining factors of MF scores. In addition, the higher BE will be, the higher AG will be, and this increases the MF scores by mediating DG. In light of these research results, it is suggested that:

1- Programs of parental education should be organized at schools and at the Offices of Education because of the positive effect of parental education on the exam scores.

2- Special emphasis should be placed on educating mothers.

3- If private institutions are to continue to be influential, to ensure equality of opportunity in education, then additional courses should be provided for students who are unable to afford such institutions.

References/Kaynakça

Arıkan, R. (2004). *Araştırma teknikleri ve rapor hazırlama*. Ankara: Asil Yayın.

Attaway, N. M., & Bry, B. H. (2004). Parenting style and black adolescents'academic achievement. *Journal of Black Psycholog*, *30*, 229-247.

Bain, H. C., & Boersma, F. J.(1983). Academic achievement and locus of control in father-absent elementary school children. *School Psychology International*, *4*(2), 69-78.

Bandura, A., Barbaranelli, C., Caprara, G. V., & Pastorelli, C. (1996). Multifaceted impact of self-efficacy beliefs on academic functioning. *Child Development*, *67*, 1206-1222.

Bilgin, M. (1990). *Ankara merkez ilçelerindeki ortaokullarda okul ve ailenin işbirliği ve sorunları*. Yayımlanmamış doktora tezi, Ankara Üniversitesi, Sosyal Bilimler Enstitüsü, Ankara.

Birleşmiş Milletler Kalkınma Programı. (2008). *İnsani Gelişme Raporu, Türkiye'de gençlik***.** http://www.undp.org.tr/publicationsDocuments/NHDR_Tr.pdf adresinden 1 Haziran 2009 tarihinde edinilmiştir.

Byrne, B. M. (2001). *Structure equation modeling with AMOS: Basic concepts, applications and programming.* Mahwah, NJ: Lawrence Erlbaum.

Cabrera, N. J., Shannon, J. D., & LeMonda, C. T. (2007). Fathers' influence on their children's cognitive and emotional development: From toddlers to pre-k. *Applied Developmental Science*, *11*(4), 208-213.

Caldas, S. J. (1995). *The effect of school population socioeconomic status on individual student academic achievement.* Paper presented at the annual meeting of the Population Association of America, San Francisco, California.

Campbell, J. R., & Uto, Y. (2002). Educated fathers and mothers have differential effects on overseas Japanese boys' and girls' math achievement. *International Journal of Educational Research*, *21*(7), 697-704.

Carneiro, P. (2008). Equality of opportunity and educational achievement in Portugal. *Portuguese Economic Journal*, *7*(1), 17-41.

Carpenter, P. (1985). Type of school and academic achievement. *Journal of Sociology*, *21*(2), 219-236.

Cheng, E. W. L. (2001). SEM being more effective than multiple regression in parsimonious model testing for management devolopment research. *Journal of Management Development*, *20*(7), 650-667.

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.

Fidan, N. ve Erden, M. (1998). *Eğitime giriş*. İstanbul: Alkım Kitabevi.

Gentilucci, J. L. (2007). Principals' influence on academic achievement: The student perspective. *NASSP Bulletin*, *91*(3), 219-236.

Gerber, S. B., & Fin, J. D. (2001). Teacher aides and students' academic achievement. *Educational Evaluation and Policy Analysis*, *23*(2), 123-143.

Goddard, R. D., Sweetland, S. R., & Hoy, W. K. (2000). Academic emphasis of urban elementary schools and student achievement in reading and mathematics: A multilevel analysis. *Educational Administration Quarterly*, *36*(5), 683-702.

Gross, S. J., Mettelman, B. B., Dye, T. D., & Slagle, T. A. (2002). Impact of family structure and stability on academic outcome in preterm children at 10 years of age. *The Journal of Pediatrics*, *138*(2), 169-175.

Hair, J., Anderson, R., Tatham., & Black, W. (1998). *Multivariate data analysis with readings* (5th Ed.). New Jersey, NJ: Prentice-Hall.

Hoyle, R. H. (1995). The structural equation modeling approach: Basic concepts and fundamental issues. In R. H. Hoyle (Ed.), *Structural equation modeling: Concepts, issues, and applications* (pp. 1-15). Thousand Oaks, CA: Sage Publications.

Karaer, H. (2007). İlköğretim ikinci kademe 8. sınıf öğrencilerinin fen bilgisi dersine yönelik tutumlarının bazı değişkenler açısından incelenmesi. *Erzincan Eğitim Fakültesi Dergisi*, *9*(1), 107-120.

Kelecioğlu, H. (2002). Ortaöğretim öğrencilerinin üniversiteye giriş sınavları ve sınavın öğrenimlerine etkisi hakkındaki görüşleri. *Hacettepe Üniversitesi Eğitim Fakültesi Dergisi*, *23*, 135-144.

Kelloway, E. K. (1998) *Using Lisrel for structural equation modeling: A researcher's guide*. London: Sage Publications.

Kelly, K. (1993). The relation of gender and academic achievement to career self-efficacy and interests. *Gifted Child Quarterly*, *37*(2), 59-64.

Kotaman, H. (2008). Türk ana babalarının çocuklarının eğitim öğretimlerine katılım düzeyleri. *Eğitim Fakültesi Dergisi*, *21*(1), 135-149.

Millî Eğitim Bakanlığı. (2007). *Milli eğitim istatistikleri, 2006-2007*. http://sgb.meb.gov.tr adresinden 22 Mart 2008 tarihinde edinilmiştir.

Millî Eğitim Bakanlığı. (2008a). *OKS puanının hesaplanması*. http://okulweb.meb.gov.tr/06/21/823666/Documents/OKS.ppt adresinden 12 Ağustos 2008 tarihinde edinilmiştir.

Millî Eğitim Bakanlığı. (2008b). *OKS tercih ve yerleştirme okul kontenjan listeleri*. http://oges.meb.gov.tr/oks/tablo.html adresinden 12 Haziran 2008 tarihinde edinilmiştir.

Millî Eğitim Temel Kanunu. (14.06.1973). *Resmî Gazete*, *sayı: 14574*.

Pang, N. S. K. (1996). School values and teachers' feelings: A Lisrel model. *Journal of Educational Administration*, *34*(2), 64-83.

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

Smith, E. P., Atkins, J., & Connell, C. M. (2003). Family, school, and community factors and relationships to racial-ethnic attitudes and academic achievement. *American Journal of Community Psychology*, *32*(1/2), 158-173.

Steinberg, L., Lamborn, S. D., Darling, N., Mounts, N. S., & Dornbusch, S. M. (1994). Over-time changes in adjustment and competence among adolescents from authoritative, authoritarian, indulgent, and neglectful families. *Child Development*, *63*, 754-770.

Stipek, D. J. (1981). Perceived personal control and academic achievement. *Review of Educational Research*, *51*(1), 101-137.

Şimşek, Ö.F. (2007). *Yapısal Eşitlik Modellemesine Giriş. Temel ilkeler ve Lisrel uygulamaları*. Ankara: Ekinoks Yayıncılık.

Tezcan, M. (1997). *Eğitim sosyolojisi* (11. baskı). Ankara (Kendi yayını).

Turan, İ. ve Alaz, A. (2007). Özel dershanelerde coğrafya öğretiminin öğrenci görüşleri çerçevesinde değerlendirilmesi . *Kastamonu Eğitim Dergisi*, *15*(1), 279-292.

Türkiye İstatistik Kurumu. (2008). *İstatistiksel tablolar.* http://www.tuik.gov.tr/VeriBilgi.do?tb_id=14&ust_id=5 adresinden 1 Haziran 2009 tarihinde edinilmiştir.

Uzun, N. ve Sağlam, N. (2005). Sosyo-ekonomik durumun çevre bilinci ve çevre akademik başarısı üzerindeki etkisi. *Hacettepe Üniversitesi Eğitim Fakültesi Dergisi*, *29*, 194-202.

White, K. R. (1982). The relation between socioeconomic status and academic achievement. *Psychological Bulletin*, *91*(3), 461-481.

Woodwall, M., Mc Mahon, W. W., Hicks, N. L., Benson, C., Coombs P., & Hallack, J. (1994). *Eğitim ekonomisi* (çeviren: Y. Kavak ve B. Burgaz). Ankara: PegemA.

Yazıcı, Z. (2002). Okul öncesi eğitiminin okul olgunluğu üzerine etkisinin incelenmesi. *Milli Eğitim Dergisi*, *155-156*, 235-245.

Yenilmez, K. ve Duman, A. (2008). İlköğretimde matematik başarısını etkileyen faktörlere ilişkin öğrenci görüşleri. *Sosyal Bilimler Dergisi*, *19*, 251-268.

Yener, H. (2007). *Personel performansına etki eden faktörlerin yapısal eşitlik modeli (YEM) ile incelenmesi ve bir uygulama* . Yayımlanmamış doktora tezi, Gazi Üniversitesi, Fen Bilimleri Enstitüsü, Ankara.

Yüksel, G. ve Sezgin, F. (2008). Üniversite öğrencilerinin başarılarını etkileyen zihinsel olmayan faktörler: Gazi Üniversitesi örneği. *Milli Eğitim Dergisi*, *179*, 66-81.