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Predictors of the Elementary School Proficiency Exams and Issues of Equality in Educational Facilities

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Abstract

The main purpose of this study is to determine whether school/student, classroom/student, teacher/student ratio, and the Human Development Index (I.G.E.) rates by province predict a province's total 6th and 7th grade Elementary School Proficiency Exam (SBS) scores. To determine the relationships between the province's total 6th and 7th grade SBS scores and the predictor variables (school/student ratio by province; classroom/student ratio by province; teacher/student ratio by province; I.G.E. rates by province), multiple regression analysis was performed. The results show that in the order of importance; I.G.E. rates by province, teacher/student ratio by province, school/student ratio by province, and classroom/student ratio by province are able to predict province's total 6th and 7th grade SBS scores.

Key Words

School/Student Ratio, Classroom/Student Ratio, Teacher/Student Ratio, Human Development Index, The Elementary School Proficiency Exam, Centralized Exams.

Transition to secondary education exam is reorganized in 2007 in Turkey. In the new system, students' academic performance began to be determined by the 6, 7, 8 grade Elementary School Proficiency Exams (SBS) which is held at the end of 6th, 7th, and 8th grades. First, the SBS was made in 2008 for 6th and 7th grade students. All over Turkey, 957.339 of the total 1.433.720 students from grade 6, 961.712 of the total 1.358.561 students from grade 7 participated in the SBS (Milli Eğitim Bakanlığı [MEB], 2008).

Central exams as the SBS covers the entire country and the vast majority of students take part in this examination. Due to broad participation, the results of this examination can provide important data for us to determine the quality and efficiency of elementary education in the country. According to a recent report (Erdoğan, Çifçili, & Meşeci-Giorgetti, 2010) about first SBS results showed that in Turkey 6 and 7 grade SBS scores differ according to provinces and regions. According to the findings of this report while Marmara and Aegean region have the highest *percentage of correct answers*, South East Anatolia region has the lowest percentage of correct answers.

Although generality and equality considered as the main defined educational principles of Turkey's educational system (Resmi Gazete, 1973), there are remarkable SBS score differences according to provinces and regions. This means that education is not efficient in some provinces and regions. It is essential to put forth these differences for consideration and find out the predictors of the SBS scores.

By all means there are many components for elementary school achievement. However, in this study school/student classroom/student teacher/student ratio by province and Human Development Index (I.G.E.) rates by province are investigated to find out their relationship with the SBS scores by province. School/student classroom/student teacher/student ratio was selected since they are concrete and easily amendable variables for policymakers in Turkey to manipulate.

Studies have focused on the relationship between school/student, classroom/student, and teacher/

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student ratio and academic achievement. These studies have different results. Especially the concept of school size is somewhat nebulous. Some studies (e.g. Caldas, 1993; Lamdin,1995) showed no relationship while others refer to the positive effect of a small school size or negative effect of a large school size (e.g. Cotton 1996; Jones, Toma, & Zimmer, 2008; Kiesling, 1967; Kuziemko, 2006; Plecki, 1991; Raywid; 1999), yet another group refer to the positive effect of a large school size (e.g. Barnett, Glass, Snowden, & Stringer, 2002; Bradley & Taylor, 1998; Sander, 1993;). According to Lee and Loeb (2000) very small schools are most often not 'small by design' but rather 'small by default.' They indicate that much of the enthusiasm for small schools focuses on those small schools that want to be small, often have selective entrance criteria, are staffed by innovative faculty and are attended by committed students. Schools that are 'small by default' are often in rural areas where populations are declining or located in urban or suburban areas where students and families seek out other educational alternatives (cited in Opdenakker & Van Damme, 2007, p. 184). Furthermore, some studies have indicated that school size has a differential effect depending on socio-economic status (SES): large school size benefits student performance in higher-SES communities while impoverished communities may need smaller schools (Alspaugh & Gao, 2004; Friedkin & Necochea, 1988).

The number of students in a class has the potential to affect how much is learned in a number of different ways. It could affect how much time the teacher is able to focus on individual students and their specific needs rather than on the group as a whole. Since it is easier to focus on one individual in a smaller group, the smaller the class size, the more likely individual attention can be given, in theory at least. Teachers may choose different materials, methods of teaching and assessment when they have smaller classes, (Ehrenberg, Brewer, Gamoran, & Willms, 2001). As a matter of fact, some studies showed that in smaller classes students have higher test scores and less disruptive behaviors (Finn & Achilles, 1990; Molnar et.al., 2000; Overbay, 2003). On the other hand the Organization for Economic Co-operation and Development [OECD] report (2006) showed that smaller classes have not always positive effects. The issue is a more complex process. Although the results of Jepsen and Rivkin (2009, p. 223) show that smaller classes raised mathematics and reading achievement scores, they also show that the increase in the share of teachers with neither prior experience nor full certification dampened the benefits of smaller classes, particularly in schools with high shares of economically disadvantaged, minority students. White and Smith (2005, p. 104) also reported that teacher shortage, inadequacy, and teacher turnover was reported to hinder learning in villages, towns, and cities.

A large number of research studies found that the background of students was the most important factor affecting achievement. The better the group a student attends the better he or she tends to perform (Alspaugh, 1991; Coleman et.al., 1966; Hanson, 1996; Lamdin, 1995; Lucas, 1996; Roeder, 2002; Stevenson, 2006). The I.G.E. rates are the most suitable indicators of province development level. The I.G.E. has been used since 1990 by the United Nations Development Program for its annual Human Development Reports. The I.G.E. had the explicit purpose to shift the focus of development economics from national income accounting to people centered policies (Gürses, 2009). Recently, the I.G.E. is started to be used as an important variable to determine academic performance according to countries and regions (e.g. Dekker & Fischer, 2008). As mentioned above, the main purpose of this study is to determine whether school/student, classroom/student, teacher/student ratio, and I.G.E. rates by province predict a province's total 6th and 7th grade SBS scores or not.

Method

Instruments

The study examines five variables: The province's total 6th and 7th grade SBS scores; school/student ratio by province; classroom/student ratio by province; teacher/student ratio by province; the I.G.E. rates by province. First of all, the province's total 6th and 7th grade SBS scores were collected from the SBS data by Turkish Ministry of Education. 6th and 7th grade SBS province total correct answer means were calculated. Next, the following variables were collected from the Turkish Ministry of Education 2007-2008 statistics for formal education: School/student ratio by province; classroom/student ratio by province; teacher/student ratio by province (MEB, 2008, p. 11-14). The I.G.E. rates by province are collected by the research which was conducted by Ünal (2008). The I.G.E. combines three dimensions; life expectancy at birth of the province, literacy rate and school gross enrollment ratio, the gross domestic product. I.G.E. rank provinces by level of human development and separate

high development (0.800–1), middle development (0.500–0.799), and low development (0–0.499) provinces (Ünal, 2008, p. 91). After compiling the six variables from the three sources, eighty-one provinces were included in this study. *Table 5* shows the data set.

Data Analysis

To determine the relationships between dependent variables (province's total 6th and 7th grade SBS scores) and the predictor variables (school/student ratio by province; classroom/student ratio by province; teacher/student ratio by province; I.G.E. rates by province), multiple regression analysis technique was performed. All statistical tests of significance were conducted with an alpha level of .05.

Multiple regression analysis generally explains the relationship between multiple independent or multiple predictor variables and one dependent variable. Linearity, normality and no-multicollinearity assumptions for the data should be met in order to apply a valid regression model (Büyüköztürk, 2002; Sipahi, Yurtkoru, & Çinko, 2006).

The assumption of normality was checked through Q-Q plot, Box plot graphics and Kolmogorov-Smirnov test. Box plot graphics were analyzed and ten outlier provinces (Ağrı, Ankara, Bursa, G.Antep, Hakkâri, İstanbul, Kocaeli, Şanlıurfa, Şırnak, Van) were excluded from the data set. The Kolmogorov-Smirnov test results shows that there is no significant departure from normality (see Table 1 for the Kolmogorov-Smirnov test results). Linearity assumption was checked by examining Scatterplot Matrix of the variables. Scatterplot Matrix indicates a linear relationship between the dependent and independent variables.

The following assessments were made to determine whether multicollinearity existed in this study. Multicollinearity refers to the relationship among the independent variables. First, the correlation matrix for all variables was checked. Multicollinearity becomes a serious problem when the coefficient is higher than 0.90 (Tabachnick & Fidell, 2001). In this study, the highest correlation coefficient was 0.871. Also The Variance Inflation Factor (VIF) values ranged from 2.83 to 5.29. Hair et al. (1998) suggest that a VIF of less than 10 are indicative of inconsequential collinearity. These results showing that multicollinearity should not be a significant problem for this study and multiple regression analysis can be used.

Findings

Variables' mean, standard deviation, minimum and maximum scores are summarized in *Table 2*. The province's total 6th grade SBS scores mean is 52.69, province's total 7th grade SBS scores mean is 52.42; mean of the school/student ratio by province 238; teacher/student ratio by province 20; classroom/student ratio by province 26; mean of the I.G.E. rates by province .704.

The results of multiple regression analysis are summarized in *Table 3* and *Table 4*. According to *Table 3*, there are positive relationships between two predictors (school/student ratio by province; I.G.E. rates by province), negative relationships between other two predictors (classroom/student ratio by province; teacher/student ratio by province) and predicted (province's total 6th grade SBS scores) variables.

School/student ratio by province; teacher/student ratio by province; classroom/student ratio by province and I.G.E. rates by province significantly predicted the province's total 6th grade SBS scores ($R=0.879$, $R^2=0.772$, $p<.01$). According to regression analysis results, all of these four variables can explain seventy seven per cent of the total variance taken from total 6th grade SBS scores.

According to standardized regression coefficient (β), predictor variables relative order of importance on the province's total 6th grade SBS scores is; I.G.E. rates by province, teacher/student ratio by province, school/student ratio by province, and classroom/student ratio by province.

According to *Table 4*, 7th grade results are similar to 6th grade results. There are positive relationships between two predictors (school/student ratio by province; I.G.E. rates by province), negative relationships between other two predictors (classroom/student ratio by province; teacher/student ratio by province) and predicted (province's total 7th grade SBS scores) variables.

School/student ratio by province; teacher/student ratio by province; classroom/student ratio by province and I.G.E. rates by province significantly predicted the province's total 7th grade SBS scores ($R=0.805$, $R^2=0.647$, $p<.01$). According to regression analysis results, all of these four variables can explain sixty five per cent of the total variance taken from total 7th grade SBS scores.

According to standardized regression coefficient (β), predictor variables relative order of importance on the province's total 7th grade SBS scores

is; I.G.E. rates by province, teacher/student ratio by province, school/student ratio by province, and classroom/student ratio by province.

Discussion

The results of this study show that province's total 6th and 7th grade SBS scores are significantly related to school/student ratio by province; classroom/student ratio by province; teacher/student ratio by province; the I.G.E. rates by province. The I.G.E. rates by province, teacher/student ratio by province, school/student ratio by province, and classroom/student ratio by province are able to predict province's total 6th and 7th grade SBS scores.

Most expected and the most striking result of the study is the positive and strong relationships between the I.G.E. rates by province and province's total 6th and 7th grade SBS scores. Province's I.G.E. rates are the strongest predictor of province's total 6th and 7th grade SBS scores. These results of the study are consistent with other research results which found significant relationship between SES, poverty and primary school performance (e.g. Coleman et. al., 1966; Lamdin, 1995; Roeder, 2002; Stevenson, 2006).

This study also shows that there are negative relationships between teacher/student ratio by province and province's total 6th and 7th grade SBS scores. Teacher/student ratio by province is the second strong predictor of province's total 6th and 7th grade SBS scores. Interestingly, this study also demonstrates that although there is negative relationship between classrooms /student ratio by province and province's total 6th and 7th grade SBS scores, classroom/student ratio by province is not so important variable to predict the SBS scores.

Another result of the study reveals that there are positive but weak relationships between school/student ratio by province and province's total 7th grade SBS scores. School/student ratio by province is the third strong predictor of province's total 6th and 7th grade SBS scores. These results of the study are consistent with many research results (e.g. Barnett et al., 2002; Bradley & Taylor, 1998; Sander, 1993). This result can be explained by Lee and Loeb's (2000) distinction of 'small by design' and 'small by default' schools. In Turkey, very small schools are most often small by default. These schools are located in poor, rural areas and students are seeking out other educational alternatives. For instance; school/student ratio is 90 in Ardahan and 130 in Kars. Besides, the I.G.E. rates of these provinces are under Turkey rates and also total SBS scores of these provinces are very low (see: Erdoğan et al., 2010). Based on these data, it can be said that, small schools in these provinces do not reduce the negative impact of the poverty or low-living standards on academic achievement. On the other hand, in the provinces which have relatively high I.G.E. rates, school/student ratio is higher. This data indicate that school size has a differential effect depending on the I.G.E. rates. These results of the study are consistent with the research studies which have shown that large school size benefits student performance in higher-SES communities while impoverished communities may need smaller schools (Alspaugh & Gao, 2004; Friedkin & Necochea, 1988).

Finally, this research reveals that the SBS scores are significantly related to school/student ratio by province; classroom/student ratio by province; teacher/student ratio by province; the I.G.E. rates by province. This study included seventy one provinces of Turkey but merely four predictors were investigated. Though regression analysis models were run, this study could not show how the I.G.E. rates, teacher/student ratio, school/student ratio, and classroom/student ratio could actually affect the SBS scores. This study could conclude only that there are significant relationships among those variables. Therefore, there is need for small-scale studies in which ethnographic and multiple methods are used.

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