

The Relationship between Academic Averages of Primary School Science and Technology Class and Test Sub-Test Scores of Placement Test of Science

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Abstract

In this research, the relationship between written exam scores of science and technology class of 6th, 7th, and 8th grades, project, participation in class activities and performance work, year-end academic success point averages and sub-test raw scores of LDT science of 6th, 7th and 8th grades. Academic success point averages were used as independent variable; raw scores of LDT Science were used as dependent variable in the study. The participants of the research were 1060 including 6th, 7th and 8th grade students who attended to four primary schools in the town called Kepez in Antalya and took the LDT Examination. The relationships between dependent and independent variables were examined through multiple regression analysis. According to the results, the independent variables at the level of 6th grade explains approximately % 43 of the total variance in the dependent variable, at the level of 7th grade explains % 53 and at the level of 8th grade explains % 49. It was concluded for independent variables of grade 6 and 8 that dependent variable explained only the variable of "written exam" significantly, all variables of grade 7 independent variables explained all variables other than "project" variable significantly.

Key Words

Level Determination Test, Performance of Science and Technology, Concurrent Validity.

The aim of educational systems is to be able to educate successful individuals, which means that educational systems should be permanently developed. Therefore, many countries benefit from the international studies to initiate their policy decisions so as to develop the students achievement in mathematics and science (Anıl, 2009; Berberoğlu & Kalender, 2005; Ceylan & Berberoğlu, 2007; Çalıřkan, 2008; Erbař, 2005; Ertuğrul, 2003; Schibeci, 1989).

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In Turkey, instructional programmes for elementary schools were improved through the constructivist approach and were put into practice in the 2005- 2006 school year. In this new approach, which has replaced traditional forms of measurement and evaluation, alternative methods of measurement and evaluation are favoured (Güzeller & Akın, 2011; Milli Eđitim Bakanlıđı [Ministry of National Education] [MEB], 2009). Students who are the human resources of the future of our country are taking exams with various kinds and are placed to educational institutions according to the result of such exams. One of the important factors considered in the placement of the students is the type of high school graduated for the determination of department in the university they get a profession. Success achieved by Anatolian and Science high schools in the placement of the students to universities make such schools charming and increases the importance of exams made for secondary school transition tests. Secondary school placement has been determined by Level Determination Tests

(LDT) since 2007 (MEB, 2010a). LDTs, which are performed within the context of SASE (System of admission to secondary education) which aims to identify the education that the individuals will have in the future, have great importance in terms of our country and individuals (MEB, 2010b). Students' performances in the LDTs help the educational policy makers and researchers to assess our education system and to be able to look at the current education system in Turkey with a critical eye (MEB, 2010a).

Although the national studies' results (Anil, Güzeller, Çokluk, & Şekercioğlu, 2010; Çevik, 2009; Deniz & Kelecioğlu, 2005; Doğan & Sevindik, 2010; Kelecioğlu, Atalay, & Öztürk, 2010; Güzeller, 2005; Kahveci, 2009; Kan, 2004; Kutlu & Karakaya, 2003; Örs, 2010) which examine students' performances in the LDT or the UEE provide some guidance to what can be anticipated in the relationship of mathematics and science achievement to various variables such as technology course written exams, projects, participation and performance work and the raw scores, these studies are rare. Furthermore, international studies which examine the relationship between students' science and mathematics achievement and past learning are also scarce (Arnold & Kaufman, 1992; Beaton et al., 1996; Carey, 1988; Ferla, Vackle, & Cai, 2009; Haladyna, Olsen, & Shaughnessy, 1982; Hudson & Rotmann, 1981; Lavonen & Laaksonen, 2009; Tobias, 1994). Educational researchers (e.g. Marzano, Pikerling, & Pollock, 2001; Tunçer & Güven, 2007) indicated that some educational strategies which increase students' achievement are: asking and forming questions, collaborative learning, homework and exercises, note-taking, performance tasks, project work, and summarising. Therefore, more studies that investigate the factors affecting mathematics and science achievement are needed.

Purpose

National high stake tests are crucial in the process of measurement and evaluation of the quality of education in a country (Akin, 2009; Doğan, 2007; MEB, 2003). However, the number of studies related with the psychometric qualities of these important exams and studies related with the relationships of this exam and various variables are very limited. By bringing teaching primary school programs to the fore by means of LDT, it is aimed to develop students' reasoning and making comments abilities and to spread the assessment into process (MEB, 2004, 2005). In this respect, it is thought to be important to analyze the relationship between

the means of the academic achievement scores of the students that they had from different means of measurement and the raw scores of LDT sub-test. Therefore, the purpose of this study is to examine the relationship between 6th, 7th, 8th grade final academic success mean score of science and technology course written exams, projects, participation and performance work and the raw scores of 6th, 7th, 8th grade LDT Science sub-test.

Method

This research is a predictive correlational study which examines the relationship between 6th, 7th, 8th grade science and technology course written exams, projects, participation and performance, the mean scores of the academic achievement at the end of the year and the raw scores of 6th, 7th, 8th grade LDT Science sub-test. In this pattern, one-way predictive relationship was tested to what extent the independent variables that are defined as written exams, projects, attendance to the classroom activities, performance work, mean scores of final academic achievement predict the dependent variable defined as the science sub-test raw score.

Participants

The study group consisted of the students that were studying in four primary schools in Kepez, district of Antalya in 2009 and took LDT Examination. In order to achieve the records of the related schools official permission could be taken for three schools from Kepez District National Education Directorate. In addition, the students studying at 6th, 7th, and 8th grades at these three schools and who own the mean scores of final academic achievement of written exams, projects, participation in classroom activities and performance work, were taken into study group. The study group is composed of 382 students studying at 6th grade, 330 students studying at 7th grade, 348 students studying at 8th grade, in all 1060 students.

Collecting the Data

The data used in the research were taken from e-school system and transcripts of 6th, 7th and 8th grade students, whose final mean score of written exam, project, involvement in class activities and performance work and science sub-test raw scores of Level Determination Test (LDT) were used (MEB, 2011).

Data Analysis

During the analysis of the data, 6th, 7th and 8th grade students' mean score of written exam, project, involvement in class activities and performance work were determined as independent variable, and science sub-test raw scores of Level Determination Test were determined as dependent variable. To search for the relation between dependent and independent variables, multiple regression analysis was used. In order to be able to make a multiple regression analysis, before starting the analysis, it is necessary to test the hypothesis of if there is multicollinearity among independent variables, whether there is an autocorrelation and whether the data set has extreme data. Multicollinearity is correlation coefficients among variables are above 0.90 (Çokluk, Şekercioglu, & Büyükköztürk, 2010, p. 35). It is called as autocorrelation when any error term is in a relationship with other error terms (Akgül & Çevik, 2003; Cohen, Cohen, West, & Aiken, 2003). It is stated that there isn't multicollinearity problem in the case of Variance Inflation Factor (VIF) having a value below 10 or Tolerance Value (TD) having a value above 0.10 (Akgül & Çevik; Çokluk et al., 2010; Tabachnick & Fidell, 2001). If the Durbin Watson value is around 2, it means that there isn't autocorrelation (Kalaycı, 2005, p. 228). Outliers in the data set were examined; 7 students from 6th grades, 11 students from 7th grades, 3 students from 8th grades, totally 21 students were omitted from the data set. Besides, deficient data were not counted in the analysis.

Results

6th grade written exam, project, involvement in class activities and performance work average points independent variables together predict dependent variables science sub-test raw scores meaningfully ($R = .655$, $R^2 = .429$, $p < .01$). Independent variables together, explain approximately %43 of the total variance in dependent variable.

According to the standardized regression coefficients, the relative order of importance on dependent variables science sub-test raw scores is written exam, project, involvement in class activities and performance work average points. When the t-test results related to the significance of regression coefficient are examined, it is seen that written exam mean score variable is a meaningful predictor on dependent variable. It is seen that project, involvement in class activities and performance work variables don't have a meaningful effect on dependent variable.

7th grade written exam, project, involvement in class activities and performance work mean scores independent variables together predict dependent variables science sub-test raw scores meaningfully ($R = .733$, $R^2 = .531$, $p < .01$). Independent variables together explain approximately %53 of total variance in dependent variable.

According to the standardized regression coefficients, the relative order of importance on dependent variables science sub-test raw scores is written exam, performance work, involvement in class activities and projects. When the t-test results related to the significance of regression coefficient are examined, written exam, performance work, involvement in class activities mean score variables are meaningful predictors on dependent variable. It is seen that project independent variable doesn't have a meaningful effect on dependent variable.

8th grade written exam, project, involvement in class activities and performance work average points independent variables together predict dependent variables science subtest raw scores meaningfully ($R = .701$, $R^2 = .491$, $p < .01$). Independent variables together explain approximately %49 of total variance in dependent variable.

According to the standardized regression coefficients, the relative order of importance on dependent variables science sub-test raw scores is written exam, project, involvement in class activities and performance work points. When the t-test results related to the significance of regression coefficient are examined, it is seen that written exam mean score variable is a meaningful predictor on dependent variable. It is seen that project, involvement in class activities and performance work variables as independent variables don't have a meaningful effect on dependent variable.

Discussion

When the regression equalities are examined separately for each grade, 6th, 7th and 8th, grade independent variables were found to explain variance as %43, %53 and %49 in order of class levels and this level can be expressed as medium-level. Among independent variables, "written exam" was determined as the only significant variable. In other words, increase in written exams will cause a rise in science sub-test raw scores. 7th grade independent variables together explain approximately %53 of total variance in dependent variable. Among independent variables, it was observed that project mean score was the only variable which did not have a meaningful effect. While

all other variables had significant effects; it was observed that the most important predictor was written exam mean scores. 8th grade independent variables together explained approximately %49 of total variance in dependent variable. In Sevindik's (2009, p. 30) research, in which she studied the relation between academic success in Turkish language, maths, science, English language and social sciences lessons and Turkish language, maths, science, English lesson and social sciences lessons sub-test raw scores in Level Determination Test in the 6th and 7th grades, it was found out a medium-level explanation rate in the 6th and 7th grade level. If this situation is stated in general, it can be expressed that it shows parallelism with this study results. Güler (2010, p. 43) found the relation between primary school students Level Determination Test results and academic success meaningful ($p < .01$) and .85. This differs from the results of this study. This may be caused because the researcher examined each 7th and 8th grade lesson variables (independent) and Level Determination Test scores (dependent) as one variable. Moreover, it was found that among independent variables, written exam mean scores were the only significant predictors.

Within the context of SASE when the importance of LDT, applied to different class levels, is thought both for our country and for individuals, it can be said that independent variables do not predict dependent variables sufficiently. When the independent variables in 6th, 7th and 8th grade levels are examined in general, it is seen that significant predictor is mean scores of written exam. In addition, it is a meaningful predictor among 7th grade independent variables. This might be resulted from the number of the exams (6) done in primary school throughout an academic year. In newly changed program, it can be arisen from teachers' not giving marks objectively to the involvement in class activities, project and performance works. Projects are elaborate assignments including acquisitions in units (MEB, 2008). Performance work is developing and measuring high level skills presenting real life like problems (Kutlu, Doğan, & Karakaya, 2008, p. 45). That performance work scores are not important predictors can be resulted from scoring reliability's limitation since evaluation criteria are not presented clearly. Another reliability problem is the possibility of students' getting support from someone else during the practice of performance work (Bahar, Nartgün, Durmuş, & Bıçak, 2009; Kutlu et al., 2008; Turgut & Baykul, 2010). The common result of the researches, in which competence of science teachers about the level of their knowledge, ability and usage of measurement and evaluation

techniques is examined, is that they have limited or inadequate knowledge and (Aslan, Kaymakçı, & Arslan, 2009; Çoruhlu, Nas, & Çepni, 2009; Doğan, 2005; Korkmaz & Kaptan, 2003). Similar situation is seen in other areas (primary school teacher, social sciences teacher, maths teacher, etc.) (Anıl & Acar, 2008; Arda, 2009; Arslan, Avcı, & İyibil, 2008; Birgin & Gürbüz, 2008; Çakan, 2004; Çelikkaya, Karakuş, & Demirbaş, 2010; Erdal, 2007; Gelbal & Kelecioğlu, 2007; Kuran & Kanath, 2009; Okur, 2008; Torçuk, 2008). It was determined that science teachers need in-service training activities related to complementary measurement applications (Metin & Özmen, 2010; Şeker, 2007). As a result of this situation, it can be said that supplementary measurement tools do not predict Level Determination Test (LDT) science sub-test raw scores.

As of 2011-2012 academic year, Level Determination Test application in SASE, applied in three different grades has been abandoned. However, this study shows that decreasing the number of exams is not enough; at the same time it is necessary to handle and review the structure of the exam. Besides, in SASE applied with the aim of increasing the effect of school applications, while calculating the final achievement score, lesson hours and the mean scores of final grades are assessed with different weighting methods. Because in final academic success results, measurement tools other than mean scores of written exam are used and these instruments do not explain subtest raw scores meaningfully, teachers should be supported with in-service training activities related to developing supplementary measurement tools, improving, applying and grading traditional measurement tools.

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