An Exploration of Predictors of English Scores in an Admission Examination: Research Notes from the Turkish Context

Abstract: - This study aimed to identify the predictors of the short answer scores in the English component of a private high school entrance exam. A purposive of 390 high school students were drawn from the student body who took the admission exam of a private co-educational high school implementing two international programs (International General Certificate of Secondary Education and International Baccalaureate Diploma Program) along with the Ministry of National Education (MoNE) program. Multiple linear regression was used to identify the predictors of English scores in the school admission examination. A statistically significant and moderate relationship was found between the scores in English and Mathematics scores in this admission exam conducted in a school located in eastern Turkey. The study is significant as it was conducted in a Turkish context using an admission assessment test for the first time. The findings yield important implications for practice for educators, practitioners, and curriculum policymakers.

Keywords: Predictors, English scores, admission examination, Turkish context, research notes, exploration, education, academic performance, factors influencing, Turkish students.

INTRODUCTION

Turkish Ministry of National Education attaches significance to the foreign language learning from primary to secondary education in their policies, curriculum review, implementation, and development to promote global citizens. With a wide range of core and elective English language and literature courses as a first foreign language, Turkish Ministry of National Education presents opportunities for educators and practitioners to create as much exposure as possible in a foreign language learning environment. In addition to these core and elective foreign language hours, textbooks are also revised on a regular basis to address a more constructivist approach to foreign language learning. Considering the recent curriculum policy developments in relation to the foreign language learning in Turkey, researchers should also investigate the links and connections between students’ linguistic skills and their content knowledge in other subject areas to offer strategies for further implications on good educational practices in foreign language acquisition.

Especially, as Turkish middle school are tested on English as a first foreign language (in addition to Turkish, mathematics, science, history, religion and ethics) in a national standardized high stakes high school entrance examinations (namely, LGS), it becomes more critical to explore the links and connections between students’ linguistic skills and their content knowledge in the other subject areas. However, there are limited studies on the correlational or regression analysis regarding the links between English as a foreign language and other academic subjects. Hence, the purpose of the study is to identify the predictors of short answer scores in English component of a private high school admission exam. This study is significant as it was conducted in the Turkish context to contribute to the existing literature. Since the other studies focus more on the academic achievement in the standardized tests, it is also important to note that this study analyses students’ performances in an admission test for a private high school enrolment.

LITERATURE REVIEW

It has been argued in the literature that there are strong links between language skills and math problem solving. Strong math skills are somehow connected with language ability because math literacy is not solely to do with knowing numbers and symbols, but it is also about understanding the words related to those numbers and symbols (Crossley, 2017). Since linguistic abilities can play an important role in students’ levels of achievement in other subjects, it is important to conduct research on predictors and barriers to success in other subject domains. The previous studies claim that the language proficiency is either a significant predictor of achievement of English language learners on the reading and math assessments (Carter, 2019) or English proficiency scores were positively associated with math and/or reading performance (Crossly, et al., 2017; McFann-Mora, 2016; Parker, et al., 2014). The studies, which focused on the relationship between linguistic knowledge and mathematical performance, were conducted in different contexts ranging from elementary to university levels.
For example, in the elementary school context, Henry, et al., (2014) investigated the predictive power of English proficiency on mathematics scores, controlling for gender, socioeconomic status, and grade level among English language learners at the Florida elementary school. This study revealed that English proficiency emerged as a statistically significant predictor of mathematics scores, but gender and socioeconomic status had no significant influence. Similarly, Banes, et al., (2018) examined the relationship between mathematical classroom discussion and performance in English proficiency for the elementary school students in California. This study found out that discussions on problem solving in math classes helped students develop their proficiency in English. There were other studies conducted in the US context with different older age groups. Lawson (2017) investigated the correlation of the performance of middle school English language learner students on their math assessments in Washington. Lawson found a strong correlation between reading and writing and math scores. Similarly, Haas, et al., (2016) examined the relationship between the English language proficiency level of English learner students at the elementary and middle school in Arizona and Nevada and their performance on math content tests. This study found out that English learner students at higher proficiency levels had higher passing rates on the math academic content tests. Finally, when it comes to the tertiary education context, Stoffelsma and Spooren (2019) reported significant medium-sized effects of English reading proficiency on university students’ science and mathematics grade point average by the end of first year.

Some other studies focused on the comparison between students from English language background and non-English background or their interethnic relations as predictors of math achievement. For instance, Ercikan, et al., (2015) examined the comparability of mathematics and science scores for students from English language backgrounds and non-English language backgrounds. The findings indicated a strong relationship with reading proficiency accounting for up to 43% of the variance in mathematics and up to 79% in science. In all comparisons, students coming from English language background either outperformed students coming from non-English language background or performed at the same level. As for interethnic relations, Barrett, et al., (2012) examined English proficiency and peer interethnic relations as predictors of math achievement among high school students. Their study found out that higher academic motivation mediated the relationship between English proficiency during high school students’ sophomore year and gains in senior math achievement scores for students.

Several studies also focused on the analysis of students’ math performances in relation to their English language proficiency in bilingual education programs or dual language immersion programs. For example, Mendez, et al., (2017) indicated that the reading and mathematics scores of English language learners who attended a dual language program were consistently higher than students who did not attend a dual language program. In the context of immersion programs, Watzinger-Tharp, et al., (2018) compared students’ math scores in relation to their English language achievement and found out that dual language immersion students who attained the same levels in English language assessment, and who received math instruction in the target language, performed at the same level as their non-dual language immersion peers in third grade math tests given in English. The study showed that students in the dual language immersion program were able to succeed academically in mathematics. Lastly, in the context of the two different bilingual education programs, Garza-Reyna (2019) analysed the college readiness of Latino English language learners educated in Transitional Bilingual and Dual Language programs by examining science and mathematics scores on the college entrance exam, ACT. Consistent with the previous findings, this causal-comparative study revealed that a statistically significant difference in the performance of the participants in mathematics and science in that the dual language program participants had a higher probability in science and mathematics of being college ready.

**METHOD**

**Research Context**

The research was conducted at an English medium private high school located in eastern Turkey. Students registered at the school were obliged to succeed both in the national and international programs to be able to graduate from the school with high school national diploma. Students were provided with an intensive educational program of English as a first foreign language in the prep classes. Afterwards, students studied the International General Certificate of Secondary Education (IGCSE) program in the grades 9 and 10. Finally, those who passed the IGCSE examinations were able to continue with the International Baccalaureate Diploma Program (IBDP) in the grades 11 and 12.

The school enrolled students in accordance with the admission examination and scholarship procedures. The main objective of the admission examinations was to choose the most appropriate student body for the school’s demanding and rigorous national and international curricula. According to the admission and scholarship policy of the school, it was essential to evaluate the students’ academic subject skills and capabilities of music and art in the admission examination. The prospective students whose cumulative grade point average was at least 80 out of 100 from their middle school were entitled to apply for a two-stage admission examination. In the first stage, Turkish, Mathematics,
Science, English and Non-verbal Reasoning Tests (multiple-choice and constructed-response items) were conducted. The second stage consisted of Turkish and English essay, interview and music and art exams.

**Data Collection**

A purposive sample of 390 middle school students, 193 of whom were male and 197 of whom were female, was drawn from a candidate student group who took the admission exam in 2019. The students in this study came from 35 different government and private middle schools which were mainly located in eastern Turkey. 435 students whose cumulative grade point average was higher than 80 out of 100 applied for the admission exam and 390 of them completed the first stage of the admission examination.

**Data Analysis**

Multiple linear regression was used to identify the predictors of short answer scores in English. The dependent variable of the study was the English short answer examination scores, while the independent variables were the Turkish short answer examination scores, the science short answer examination scores and the mathematics short answer examination scores. The sample did not include any missing data or any outlier, which deviates from the mean by more than three standard deviations. Data were checked for residual normality. Additionally, the variation inflation factor values were checked for the multicollinearity threat, which were all tolerable.

**FINDINGS**

Data were first analysed descriptively by computing the means and standard deviations for each continuous variable. Correlations between continuous variables were given with Pearson’s correlation coefficient \(r\), where appropriate. Data were analysed descriptively including the mean and the standard deviation for continuous variables: ENG (\(M = 15.16; \, s = 10.65\)), TUR (\(M = 29.02; \, s = 8.99\)), SCI (\(M = 21.34; \, s = 7.60\)) and MAT (\(M = 22.59; \, s = 10.75\)). The correlation coefficients were computed to describe the bivariate relationships between the variables. Table 1 shows that students who were more successful in the Turkish open-ended test were more likely to be successful in the mathematics open-ended test (\(r_{TUR- MAT} = .382, p<.01\)), or in the science open-ended questions (\(r_{TUR- SCI} = 0.342, p<.01\)).

![Table 1. Bivariate relationships between variables in the model](image)

A multiple regression analysis was used to identify the predictors of the short answer scores in English in the admission exam. A priori power analysis with medium effect size \((f = 0.15)\) and power = .95 indicated a minimum sample size of 119. The multiple regression analysis was conducted to estimate the extent of how the Turkish, Science and Mathematics open-ended scores predicted the short answer scores in English. The multiple regression equation with three predictors was given with unstandardized \(b\) coefficients as follows, where \(F(3,386) = 92.617; p<.01; \, ENG = 0.299(TUR) + 0.397(MAT) + 0.207(SCI) - 6.89\).

The structural coefficients, unstandardized \(b\) coefficients and the \(R^2\) change for a possible suppressor variable were investigated. The results indicated that the most important statistically significant predictor of the English scores appears as the mathematics scores (\(b=0.397, p<.01\)). The multiple regression model explained about 42 percent of the total variance in the mathematics scores (\(R^2=0.419; \, R^2 \text{ adjusted}=0.414, p<.01\)). It can be inferred that this indicates a large effect size compared to the initial assumption.

**DISCUSSION**

This study aimed to identify the predictors of the short answer scores in English component of an admission exam for a private high school implementing two international programs along with the national program. The study found a statistically significant and a moderate relationship between the scores in English and Mathematics scores in the admission exam. The study is significant as it was conducted for the first time in a Turkish context using a high school admission assessment test rather than the standardized tests used in international contexts. Consistent with the existing literature, the findings of the study confirmed that foreign language achievement may be a key variable for predicting the achievement in mathematics and that there is a positive relationship between linguistic and mathematical knowledge (Carter, 2019, Crossly, et al., 2017; Henry, et al., 2014; Lawson, 2017; McFann-Mora, 2016; Parker, et al., 2014).

The findings of the current study also imply some important implications for practice for educators, practitioners, and curriculum policy makers for improving the foreign language acquisition programs along with mathematics curriculum. In order to promote students' proficiency in foreign language, educators and practitioners can seek for
strategies to motivate math-science track students to improve their level of foreign language, review the course outlines, yearly plans and curriculum implementation plans for the preparatory year program in high schools. Practitioners can also refer to Zhao and Lapuk’s study (2019), which reports useful tools to support English learners in the mathematics classroom. These tools can be used to increase students’ mathematics vocabulary, promote motivation and understanding as they engage with problem-solving, develop their writing skills, and improve oral expression ability for English in the mathematics classroom.

CONCLUSION

One of the limitations of this study was that the study was only quantitative. Qualitative data including interviews, focus group interviews, and lesson observations would have provided further insights and additional information on the relationship between linguistic abilities and mathematical or scientific reasoning abilities. Another limitation of the study was that the study involved only a small sample (390 grade 8 students who mainly come from eastern Turkey). Thus, replicated studies can be conducted by including more middle students taking various admission tests to get into private schools in Turkey. In addition, including this current study, existing literature focuses more on the relationship between linguistic and mathematical abilities. Hence, further studies with mixed methods design can investigate the extent to which foreign language acquisition has an influence on students’ academic achievement in sciences (physics, chemistry and biology).

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REFERENCES
