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STEM SCHOOLS VS. NON-STEM SCHOOLS: COMPARING STUDENTS MATHEMATICS STATE BASED TEST PERFORMANCE

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Abstract
The purpose of this study is to determine how students who participated in T-STEM schools performed on the Texas Assessment of Knowledge and Skills (TAKS) mathematics test compared to their corresponding peers who participated in traditional public schools in Texas. The present study included 18 T-STEM schools, and 18 matched non-STEM schools. The sample for this study is 1887 studentswho were in 11th grade in 2011. A hierarchical linear modeling (HLM) was used to compare students' mathematics scores.This study also investigates if students who come from traditionally underserved subpopulations increase their mathematics score by participating in T-STEM schools. Results revealed that the mean mathematics scores on TAKS of STEM and non-STEM school students were not statistically significantly different from each other, but participating in STEMschools resulted in a statistically significantly increase on Hispanic students' mean mathematics score relative to the reference group (White, male, high-SES, non-STEM).
Key Words: STEM, T-STEM academies, Inclusive STEM schools, TAKS, TEA.

Introduction

STEM education refers to teaching and learning in the disciplines of science, technology, engineering, and mathematics. From a broad perspective, STEM education in both formal and informal settings has been considered a set of activities in which students engaged (Gonzalez &Kuenzi, 2012). STEM education becomesa pivotal topic for educators. The foremost reason why STEM education has captured the attention of educators is because STEM practices (e.g., Project-Based Learning and inquiry-based learning) in K-12 classrooms enable students to relate their knowledge, skills, and beliefs across STEM disciplines (International Technology Education [ITEA], 1999), thus promising more meaningful science and mathematics learning for K-12 students. Besides researchers and educators, governors have also emphasized the importance of K-12 STEM education for the country's future economic competitiveness in the global market. Several reports by the National Academy of Sciences, National Academy of

Engineering, and Institute of Medicine (2011a) have already linked the importance of K-12 STEM education to maintainingthe United States' current scientific leadership and economic power.

The success of STEM disciplines plays a vital role for the country's futurein the competitive global market (President's Council of Advisor on Science and Technology, 2010). In response to the importance of STEM education for the United States' scientific leadership, the United States' President Obama has launched the *Educate and Innovate*program for the purpose of increasing students' interests toward STEM-related majors by cultivating STEM literacy in K-12 education. Buxton (2001) investigated the role of K-12 education on students' interest in STEM related subjects. Results from this study revealed that the K-12 education years are vitally important in developingstudents' interest in one of the STEM-related subjects.Therefore, increasing K-12 students' interest in STEM-related disciplines is essential for leading more students to pursue STEM career pathways in postsecondary education settings.

Cultivating STEM Interest in K-12

Most researchers have found "interest" as one of the most promising factors influencing students' future career plans (Beiber, 2008; Calkins &Welki, 2006;Kuechler, Mcleod, &Simkin, 2009). "Interest" was defined by Beiber (2008) as "relatively stable preferences that are focused on objects, activities, or experiences" (p. 1). Kuechler et al. (2009) suggested that students choose certain majors only when they are exposed to related real world activities. It is students' experiences during K-12 education years that lead them to have more positive attitudes toward certain majors. Thus,engaging students in real world STEM activities has increased students' interests in STEM related disciplines (Sahin, 2013). For example, Sahin, Erdogan, Morgan, Capraro, and Capraro (2013) investigated the relationship between high school students' SAT scores, course enrollment, and pursuit of major at the college level. Results from this study revealed that students with higher SAT mathematics scores were more likely to choose STEM related majors in their college years. Additionally, students involved in advanced placement (AP) courses pursued more STEM related majors than students who did not. In summary, students' experiences during K-12 education years were positively correlated with their course selection, overall achievement, and persistence in a certain field (e.g., in one STEM fields) (Beiber, 2008). Therefore, investigating what types of schools (e.g., STEM schools vs. non-STEM schools) develops students' mathematics and science interests and, in turn, increasestheir mathematics and science achievement is vitally important.

Needs for K-12 STEM Education

Three mainreasons account for U. S. concerns about the state of K-12 STEM education. The first reason is students' science and mathematics test performance as measured by the National Assessment of Educational Progress (NAEP)showed that students were not proficient in mathematics and science (Schmidt, 2011). Additionally, international indicators (e.g., TIMMS and PISA) have showed that students from the United States did not perform well in mathematics and science compared to other developed countries (e.g., Singapore, and China), thus putting their scientific leadership and economic power in danger. The second reason why the United States is concerned about K-12 STEM education is due to the size of the mathematics and science achievement gapsbetween students who come from the traditional upper class and those students who come from diverse ethnic and low-SES backgrounds. For example, Hispanic students performed far lowerthan the mean in mathematics and science onthe national examinations (Hill, Bloom, Black, &Lipsey, 2008).

One of the goals for STEM education reported by National Research Council (2011) was to increase the number of underrepresented students who pursue STEM majors in their post-secondary education in order to fill an increased portion of prominent STEM-related job needs in the United States. *Educate and Innovate (2009)* was developed to address the achievement gap issue, and aims to increase underserved students' interest in mathematics and science during the K-12 education years (Executive Office of the President, 2009). Young (2005) showed that despite the increasing number of underrepresented students entering post-secondary education, these students have been underrepresented in pursuing STEM majors. Later, theNational Science Board (2010) reported that although non-White and non-Asian groups represent one quarter of the entire U.S. population, only 10 percent of all STEM related doctorates are awarded to these groups. Quickly changing demographic patterns in the United States require that non-White and non-Asian students pursue STEM related careers to fill an increasing portion of prominent STEM positions in the United States.

Although there is an effort to increase the number of students who pursue advanced STEM degrees, increasing the number of students who pursue the STEM related workforce (e. g., K-12 STEM teachers, computer and medical assistance, and nursing) isequally important for the nation's economic competitiveness in the global market (U.S. Department of Labor, 2007). Lacey and Wright (2009) noted that these jobs do not require advanced STEM degrees. Having a vocational certification with a STEM related major or a bachelor's degree in a STEM associated field is sufficient. Not surprisingly, the second goal for K-12 STEM education reported by the NRC (2011) is to "Expand the STEM-capable workforce and broaden the participation of women and minorities in that workforce" (NRC, 2011, p. 5). This goal was important because the domestic needs for a workforce in STEM associated fields increased rapidly from 2008 to 2009. The National Science Foundation (2010) reported thatwhile the unemployment rate from 2008 to 2009 increased 3.8%, the needs of the workforce in STEM associated jobs increased by 3.3%. In the next decade, it is projected that there will be 20 new occupations, and 80% of these occupations will be related to STEM fields. While 5% of these occupations will requirean advanced STEM degree, 75% of them will require solely vocational certification or an undergraduate degree with a major in a STEM associated field (Lacey & Wright, 2009). In order to fill a rapidly increasing portion of the STEM workforce, more and more K-12 STEM students need to pursue STEM related majors in their post-secondary education andlater follow STEM related career pathways. The NRC (2011) noted that achieving this goal is essential because "the nation's economic future depends on preparing more K-12 students to enter these fields" (p. 5).

The *Educate and Innovate* program's central aim is to increase STEM literacy in K-12 educationregardless of students' future career plans. NRC (2011) also reported the last and most importantgoal for STEM education isto increase STEM literacy, which is a key 21st century skill, for all students even if they do not pursue a STEM-related career pathway. The goal is to provide students with the necessary knowledge and understanding of basic scientific and mathematical concepts that they face in real life (NRC, 1996). Achieving this goal is vital because current employers in various industries have complained of their employees' lack ofmathematics, technology, and problem-solving skills (National Governors Association, 2007). Increasing STEM literacy for all students, not just for those who follow STEM-related career pathways in their postsecondary education, will make future citizens capable of dealing with the complex problems of the 21st century's scientific and technology-driven society (NRC, 2011).

Statement of purpose

Achieving all three goals mentioned above for the nation's K-12 STEM education ispossible by incorporating STEM for all students. Beiber (2008) noted that students' school experiences were positively correlated with their science and mathematics course selection, achievement, and persistence in these fields. Therefore, it is predicted that participation in STEM schools may increase students' science and mathematics achievement because these schools do the following: a) emphasize the importance of STEM disciplines, b) target underserved population, c) implement rigorous science and mathematics curriculum, d) have more STEM instructional time, e) provide more resources for STEM teaching and learning activities, and f) hirequality science and mathematics teachers (NRC, 2011). Figure 1 shows the conceptual framework for the present study.

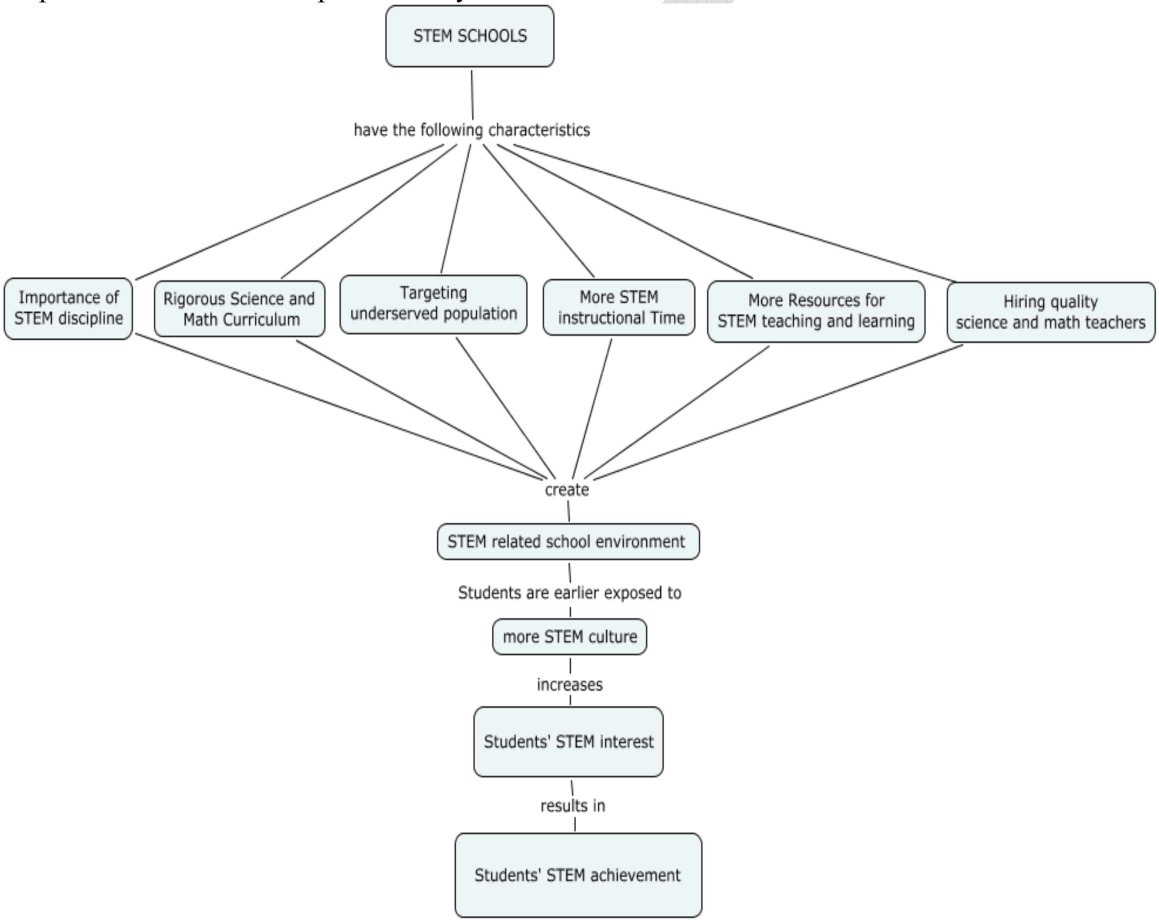

Figure 1.Conceptual framework for the present study.

STEM Schools

STEM schools are designed to decrease the mathematics and science achievement gaps among various ethnic groups and to increase all K-12 students' mathematics and science scores on both national and international standardized tests. There are three types of STEM schools: selective STEM schools, inclusive STEM schools, and schools with STEM-focused career and technical education (CTE).

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Selective and inclusive STEM schools are the two most common STEM schools across the Unites States (NRC, 2011). The curriculum for the selective and inclusive STEM school was designed to improve students' science and mathematics learning by engaging students with hands-on tasks in a collaborative and competitive environment (Gonzalez &Kuenzi, 2012). There are some differences between these two types of STEM schools in terms of their organization. The clearest distinctionbetween selective STEM schools and inclusive STEM schools is the admission criteria. With regard to admission criteria, selective STEM schools admit only talented and motivated students to STEM related fields while inclusive STEM schools have no selective admission criteria. Because of the disparity among admission criteria between the two STEM-school types, inclusive STEM schools are considered to serve a broader population (NRC, 2011). Young, House, Wang, and Singleton (2011) noted that "Inclusive STEM schools are predicted on the dual promises that math and science competencies can be developed, and students from traditionally underrepresented populations need access to opportunity to develop these competencies to become full participants in areas of economic growth and prosperity" (p. 2). Therefore, inclusive STEM schools have a unique structure to achieve the three goals stated by NRC (2011) for K-12 STEM education. In the present study, we only included inclusive STEM schools,which will be compared with non-STEM schools.

In the present study, we chose inclusive STEM schools in the state of Texas because Texas has one of the biggest STEM initiatives. The first six T-STEM academies started serving students in 2006, and the number of T-STEM academies has persistently expanded from 2006 to 2014. Currently, there are 65 T-STEM academies (26 campuses for only high school students and 39 campuses for both middle and high school students) serving about 35,000 students in Texas. Therefore, selecting inclusive STEM schools in Texas provides us a large data set and makes sure we have reasonable time to observe changes on students' science and mathematics achievement after schools turned into STEM schools.

There are also two distinguish characteristics of T-STEM academies which play roles on our data selection from the state of Texas. One important characteristic of T-STEM academies is the "blueprint" that guides schools in the planning and implementation of innovative instructional methods. The blueprint specifies that all T-STEM schools are inclusive, and cannot be selective at the time of enrollment. In addition, the "blueprint" specifies that each T-STEM academy needs to have at least 50% of students who are economically disadvantaged and at least 50% of students who come from traditionally underrepresented subpopulations (Young et al., 2011). Second important characteristic of inclusive STEM schools in Texas is T-STEM centers. T-STEM academies were divided into parts based on their regions, and each region incorporates a T-STEM center. The T-STEM centers' aim is to help T-STEM academies by creating innovative STEM instructional materials and providing effective professional development to teachers.There are seven T-STEM centers, and these support more than 2,800 STEM - related major teachers to empower their teaching in STEM-related subjects (Texas Education Agency, 2013). Besides creating innovative science and mathematics classrooms and delivering professional development to teachers, these educational centers are charged with a) designing innovative STEM curricula; and b) creating partnerships among businesses, universities, and school districts. T-STEM academies, along with professional development centers and networks, work collaboratively to improve the quality of instruction and students' academic performance in STEM-related subjects at secondary schools. T-STEM academies are also well equipped with labs that allow teachers to adopt innovative instructional methods in science and mathematics classrooms.

Research Questions

1) How do students who participated in T-STEM schools perform on TAKS mathematics compared to their corresponding peers who participated in traditional public schools in Texas?

2) Controlling for students' demographics (gender, ethnicity, and SES), what is the effect of school types (STEM schools and non-STEM schools) on students' mathematics achievement?

Method

In this quantitative research project, student and school-level data about students who participated in inclusive T-STEM high schools, as well as matched students who participated in non-T-STEM high schools, were obtained from the Texas Education Agency (TEA) website. This state-wide analysis was based upon 36 schools, of which 18 were T-STEM and 18 were matched non- STEM schools. In this study, only 18 T-STEM academies of 65 T-STEM academies were selected because the selected schools needed to have the criteria of being turned into inclusive STEM schools before or during the 2008-2009 academic year. Thus, the present study included only students who participated in STEM academies for at least three years.

In order to match students who participated in 18 T-STEM academies with their corresponding peers who participated in 18 non-STEM schools, school-level data was first matched by following the TEA campus comparison method. This comparison is based upon the following school-level variables: 1) ethnicity (% of Hispanic students, % of African American students, and % of White students), 2) economic disadvantage status (free lunch, reduced price lunch, other public assistance, and none), 3) English language proficiency (met with English language proficiency state standard, and not met with English Language proficiency standard), and 4) school mobility rate.

The sample consisted of 1887 students (940 from T-STEM schools and 947 from non-STEM schools) who received a TAKS mathematics score in 2011. Students were excluded from the study if they did not have a TAKS mathematics score in 2011. Students' 11^{th} grade mathematics TAKS scale scores were used as an outcome of students' mathematics achievement. Students' gender, ethnicity, and SES background were added as predictors to the model in order to determine the promising effects of STEM schools.

Procedures for Analysis

This study used hierarchical linear modeling (HLM) techniques to construct a two-level model for analysis. This technique allows the simultaneous estimation of between-schools variables (STEM schools and non-STEM schools), and within-school level variables (students' mathematics TAKS scale scores, ethnicity, gender, and SES). Kreft, DeLeuw, and Van Der Leeden (1994) noted that HLM software provides the same results as other commonly used software (e.g. SAS, and ML4), and is perfectly appropriate for disentangling multilevel effects. A series of model finesses were estimated by using HLM software, and this procedure resulted in the best model with specific student and school-level variables. Based on a theoretical and empirical consideration reported by NRC (2011), each student-level variable was added one at a time to the model and evaluated for statistical significance. The same procedure was followed for the school-level predictor, and its effects were also evaluated for statistical significance. The slopes of student-and school-level variables were "fixed" and not allowed to randomly vary if random effects of these variables were not statistically significant in improving the model fitness. The indices of model fitness were based on a Chi-square test, in which deviations' scores and degrees of freedom (*df*) provided by HLM software were subtracted from each other to determine whether the slope of the variables had random or fixed effects.

Result

Model Specification

Using the variables discussed in the NRC (2011) report, student and school-level data were added to the model in order to test whether STEM schools increase students' mathematics achievement in comparison to students' mathematics achievement in non-STEM schools. Students were treated as Level 1 and schools as Level 2, indicating that this study investigated school types (STEM schools and non-STEM schools) that may be associated with average mathematics achievement of students. This study also examined how students' demographics and school types associated with students' mathematics achievement may vary from STEM schools to non-STEM schools. Once the slope of each variable was decided to be "fixed" or "random," the best model (see in table 1) was drawn.

Table 1
Model Summary

Level	Model
Level-1	$MATH.2_{ij} = \beta_{0j} + \beta_{1j}*(H_{ij}) + \beta_{2j}*(B_{ij}) + \beta_{3j}*(A_{ij}) + \beta_{4j}*(FEMALE_{ij}) + \beta_{5j}*(SES_{ij}) + r_{ij}$
Level-2	$\beta_{0j} = \gamma_{00} + \gamma_{01}*(STEM9\_ME_j)$, $\beta_{1j} = \gamma_{10} + \gamma_{11}*(STEM9\_ME_j)$, $\beta_{2j} = \gamma_{20} + \gamma_{21}*(STEM9\_ME_j)$, $\beta_{3j} = \gamma_{30} + \gamma_{31}*(STEM9\_ME_j)$, $\beta_{4j} = \gamma_{40} + \gamma_{41}*(STEM9\_ME_j)$, $\beta_{5j} = \gamma_{50} + \gamma_{51}*(STEM9\_ME_j)$
Mixed	$MATH.2_{ij}=\gamma_{00} +\gamma_{01}*STEM9\_ME_j +\gamma_{10}*H_{ij} +\gamma_{11}*STEM9\_ME_j*H_{ij} +\gamma_{20}*B_{ij} + \gamma_{21}*STEM9\_ME_j*B_{ij} +\gamma_{30}*A_{ij} +\gamma_{31}*STEM9\_ME_j*A_{ij} +\gamma_{40}*FEMALE_{ij} + \gamma_{41}*STEM9\_ME_j*FEMALE_{ij} + \gamma_{50}*SES_{ij} + \gamma_{51}*STEM9\_ME_j*SES_{ij} + r_{ij}$

In the study, all independent variables were categorical variables. A dummy coding strategy was necessitated to use these independent variables in HLM software. In this procedure, males were taken as the reference group for gender; Whites were the reference group for ethnicity, high-SES background of students was the reference for SES, and, non-STEM schools were specified as reference group for schools. Therefore, the baseline reference group in the present study comprises students who are White, male, and from a high-SES background in non-STEM schools. This group was selected as the reference group because this group traditionally is considered to be upper class, and the previous studies already showed the existing mathematics achievement gap between students who come from underrepresented groups and students who come from the upper class (Bicer, Capraro, &Capraro, 2013). In table 2, the intercept (γ_{00}) is estimated as 2356.4 (*SE* = 9.6) $p < 0.01$, which is the predicted mean mathematics score for students who are in the reference group in the 11^{th} grade. The predicted mean differences of mathematics scores between STEM and non-STEM schools for students who are white, male, and high-SES is (γ_{01} = 31.39, (*SE* = 23)), but the predicted mathematics scores of these two groups were not statistically significantly different from each other at $p > .05$.

Table 2
Final estimation of fixed effects

Fixed Effect	Coefficient	Standard error	*t*-ratio	Approx. *d.f.*	*p*-value
For INTRCPT1, β_0					
INTRCPT2, γ_{00}	2356.398071	9.605963	245.306	1886	<0.001
STEM, γ_{01}	31.389495	23.552789	1.333	1886	0.183
For Hispanic slope, β_1					
INTRCPT2, γ_{10}	-93.746935	12.718360	-7.371	1886	<0.001
STEM, γ_{11}	56.018430	28.071012	1.996	1886	0.046
For Black slope, β_2					
INTRCPT2, γ_{20}	-155.714380	25.045360	-6.217	1886	<0.001
STEM, γ_{21}	29.201812	39.916900	0.732	1886	0.465
For Asian slope, β_3					
INTRCPT2, γ_{30}	-130.376656	153.533661	-0.849	1886	0.396
STEM, γ_{31}	184.122369	164.351750	1.120	1886	0.263
For FEMALE slope, β_4					
INTRCPT2, γ_{40}	-10.329956	8.238116	-1.254	1886	0.210
STEM, γ_{41}	-13.541547	16.020400	-0.845	1886	0.398
For SES slope, β_5					
INTRCPT2, γ_{50}	-16.021416	11.587114	-1.383	1886	0.167
STEM9, γ_{51}	4.613972	20.751441	0.222	1886	0.824

Participation in STEM schools by students who come from a minority ethnic background (Asian, Black, and Hispanic) showed positive effects on students' overall mathematics score, but the only statistically significant interaction effect of 'ETHNICITY' and 'STEM' is for Hispanic students with ($\gamma_{11} = 56.02$, (*SE* = 28.07), $p < .05$). This means that participating in STEM schools statistically significantly increased Hispanic students' mathematics score relative to the reference group's predicted mean mathematics score. Hispanic students in STEM schools performed 181.16 units predicted mean score higher than Hispanic students in non-STEM schools. The interaction effect of participating STEM academies and gender was negative for female students, but this interaction effect was not statistically significant. This interaction was formed by multiplying the scores for the variables 'STEM" and "FEMALE," with the negative value (γ_{11} = -13.54) meaning that male students' predicted mathematics score tends to increase more in comparison to female students' mean mathematics score as they participate in STEM schools. Comparing female students' predicted mean mathematics score in terms of their school types yielded that female students who participated in STEM schools performed 31 units higher on the 11^{th} grade TAKS standardized mathematics test than female students who participated in non-STEM schools. For students who come from a low-SES background, the interaction effect of participation in STEM schools and SES background on students' predicted mean mathematics score was positive ($\gamma_{51} = 4.61$, (SE = 20.75)), but not significant at $p > .05$. This interaction means that students who come from lower SES backgrounds and participate in STEM schools tend to increase their mathematics score more in comparison to students who come from higher-SES backgrounds and participate in STEM schools. Comparing high and low-SES background students' mathematics scores in terms of the students' school types revealed that students who come from a low-SES background and participate in STEM schools performed 52 units higher on their math score than students who come from low-SES background and participate in non-STEM schools.

Discussion

The purpose of the present study is to examine how students' performance on TAKS mathematics differs in terms of their school type as STEM and non-STEM schools. Comparing students' mathematics TAKS performance in terms of their school types has been already examined when students were in grades 9 and 10; however, no study has investigatedhow students' TAKS mathematics performance differs in terms of students' school type (i.e. STEM and non-STEM)when students were in grade 11. This is one of but not the main reason why the present study focuses on only 11th grade students. The main aim of focusing on 11th grade isto see the effect of participating in T-STEM schools on students' mathematics achievement after they completed 9th, 10th, and 11th grades in T-STEM schools compared to their corresponding peers' mathematics achievement in non-STEM schools.

Previous research's findings revealed that 9th graders in T-STEM academies performed slightly better in mathematics than their matched peers in non-STEM schools. Likewise, 10th graders in T-STEM academies performed better in mathematics than their counterparts in comparison schools. Although there was a difference in students' mathematics performance favoring T-STEM academies, the effect sizes were ranged from 0.12 and 0.17 (Young et al., 2011). The present study did not find a statistically significant difference in students' TAKS mathematics scores between T-STEM and matched non-STEM schoolswhen controlling for ethnicity, gender, and SES. This can be explained by the selection of the reference group and T-STEM schools' profiles. In the present study, the reference baseline group was selected as White, male, high-SES background students in non-STEM schools. As reported in the T-STEM blueprint, at least 50% of students in T-STEM academies need to come from the underserved population and 50% need to be economically disadvantaged (Young et al., 2011). Students who are academically successful and come from the upper class may not be eager to participate in T-STEM academies due to the diverse profile of T-STEM schools.

The most important and interesting finding of this study is the interaction effect of 'STEM' and 'Hispanic, which is statistically significant $p < 0.05$. This means that participating STEM schools statistically significantly increase Hispanic students' mathematics score relative to the reference group's predicted mean mathematics score. This finding is consistent with prior work by Crisp, Nora, and Taggart (2009), which showed that being Hispanic was not found to decrease the chance of a student's success in STEM compared to White students.Controlling for gender and SES in the present study, results show being Hispanic in STEM schools increases the chance of success in mathematics compared to White students in non-STEM schools controlling for gender and SES; however, being Hispanic in non-STEM schools decreases the chance of success in mathematics compared to White students in non-STEM schools controlling for gender and SES. This conclusion confirms the finding that Hispanic students increased their scores on high-stakes test when they participate in T-STEM academies (Gourgey, Asiabanpur, Crawford, Grassso, & Herbert, 2009). These findings might be explained by the school factors (Gainen, 1995) that may influence students' mathematics achievement. Thefirst factor is the highly competitive classroom environment in non-STEM schools that may discourage Hispanic students from being successful and represented in mathematics. Because T-STEM academies need to have at least 50% of their students from traditionally underrepresented subpopulations, Hispanic students may have more opportunity to be represented in mathematics classrooms compared to their Hispanic peers in non-STEM schools. The second factor is a lack of engaging teaching and learning practices that promote students' active participation, which is also related to the first factor (Gainen, 1995). Teachers in T-STEM academies are encouraged to implement innovative teaching and learning methods in mathematics classrooms. These practices include but are not limited to project based learning, problem based learning, and inquiry based learning. These practices enable students tobecome actively involvedin their learning process. Hurtado et al. (2006) indicated that Hispanic students are more likely to be successful in mathematics when they participate in a student-centered classroom rather than a traditional classroom. This might be explained by interaction opportunities that arise in student-centered classrooms. Because T-STEM schools need to have at least 50% of their students from underrepresented subpopulations, Hispanic students may not feel themselves a minority group in T-STEM schools (Cole &Espinoza, 2008). Thus, they may interact more with their teachers and friends in a student-centered classroom environment because they may feel more comfortable than they do in school and classroom settings in which they are considered as minorities. Cole and Espinoza (2008) found that Hispanic students performed better in mathematics when they had cultural congruity in their schools. Active engagement in a collaborative environment might be better for Hispanic students than silent listening in traditional classroom.

The finding that Hispanic students' mathematics achievement in STEM schools is higher than White students' mathematics achievement in non-STEM schools controlling for gender and SES is important because decreasing the mathematics achievement gap between students who come from the traditional upper class and students who come from underrepresented subpopulations is essential to increasing the number of STEM majored people in order to maintain the United States' scientific leadership (NRC, 2011). By the end of 2050, the number of Hispanic studentsaged between 5 and 17 will be more than 20 million (Chapa & De La Rosa, 2006). This rapid change in demographics also emphasizes how Hispanic students' successes in mathematics play an essential role in the United States' future scientific leadership and economic power. The present study suggests that the number of STEM schools needs to be extended especially in high Hispanic-population areas. This may help Hispanic students increase their interest in mathematics and other STEM related fields. Therefore T-STEM schools may achieve the NRC's goal of decreasing the achievement gap between students who come from underrepresented subpopulations and students who come from the traditional upper class.

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