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I. Introduction

The economic future of the United States is dependent on advances in science, technology, engineering, and mathematics (STEM). According to My College Options and STEM Connector (2013), jobs in science and engineering are predicted to increase at more than twice the rate of the overall U.S. labor force by 2018. However, few U.S. workers have backgrounds in STEM (President's Council of Advisors on Science and Technology [PCAST], 2010; Tank, 2014). Therefore, the pursuit of STEM education and careers is encouraged for the United States to remain competitive in a global economy (National Research Council [NRC], 2011).

Numerous research investigations exist (e.g., NRC, 2011; National Science Board, 2014; PCAST, 2010; Tank, 2011) related to the need for a greater emphasis on students mastering complex skills required for the 21st century workforce. Of critical importance is for students to graduate from high school prepared for college-level work so one day they will be able to compete in a global community (Gigliotti, 2012). However, as revealed in the National Assessment of Educational Progress (NAEP) report, many high school graduates lack proficiency in subject-matter knowledge and analytical skills necessary for college-level work (Venezia & Jaeger, 2013). Many students lack proficiency in reading and mathematics, and one half of first-time college students in the United States enrolled in some type of remedial course. More specifically, 42% of all college students needed at least one remedial mathematics course (National Science Board, 2014).

In Texas, the State of Texas Assessment of Academic Readiness (STAAR) tests are administered to students in public schools under state and federal accountability requirements. The STAAR tests replaced the former Texas Assessment of Knowledge and Skills (TAKS) test and were implemented during the 2011-2012 school year. Included in state tests requirements are STAAR Reading and Mathematics tests administered yearly in Grades 3–8, STAAR Science tests administered in Grades 5 and 8, and STAAR Social Studies test administered in Grade 8. The STAAR tests are more rigorous than the TAKS tests and are intended to measure students' college and career readiness, starting as early as Grade 3.

However, aside from accountability measures, a thorough examination of efforts made in K-12 school settings is needed to ensure students have the knowledge and skills necessary to enroll and persist in postsecondary education. For example, STEM instructional techniques should include authentic, real-world connections experienced by learners (Vasquez, 2014). Even though multidisciplinary teaching is recommended by advocates of STEM education, this approach is not widely used in classrooms (Tank, 2014). Moreover, according to Nikischer (2013) and PCAST (2010), interest and achievement gaps in STEM exist among underrepresented students (i.e., Black, Hispanic, girls, students in poverty).

II. The Role of Poverty

The percentage of Americans living in poverty increased from 18% to 22% in the 5-year span from 2008 through 2013 (Potter, 2015). Researchers at the

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Annie E. Casey Foundation (2015) estimated 22% of America children live in poverty. Further, children from states in the south and southwest live in poverty at a higher rate. An estimated 25% of Texas children live in poverty, and 11% in extreme poverty. Twenty-four percent of Hispanic children and 34% of Black children live in poverty in Texas, compared with 11% of White children. Nationally, the percentages of children living in poverty are the same or very close for two groups of children (i.e., Hispanic and White children); however, the percentages of poverty for Black children have increased to 38% (The Annie E. Casey Foundation, 2015).

A noteworthy gap in achievement scores exists based on student socioeconomic status. Students in the highest socioeconomic status entered kindergarten with cognitive scores that were 60% higher than their peers from the lowest socioeconomic groups (Beatty, 2013). These gaps in achievement continued throughout the students' K-12 education.

Gottfried and Williams (2013) performed a long-term study in which they compared students' math club and science club participation to their mathematics and science GPA. The researchers discovered almost all subgroups that participated in after school math or science clubs had higher GPAs, but students who participated in after school clubs and who were categorized as living in poverty did not show any GPA gains. This lack of progress was documented for students living in poverty, regardless of gender or ethnicity/race (Gottfried & Williams, 2013).

Students from economically disadvantaged homes start school with several disadvantages including (a) access to fewer educational resources at home; (b) lack of healthcare and proper nutrition; (c) slower development of language skills, letter recognition, and phonological awareness; and (d) tendency toward more absences (Farmbry, 2014). Further, existing barriers for students who are economically disadvantaged include (a) enrollment in underfunded schools, (b) an absence of educational models, (c) a culture that lacks emphasis on schooling, and (d) an inability to pay for higher education (Gaughan & Bozeman, 2015). Moreover, students who are economically disadvantaged, regardless of gender or ethnicity/race, often lack the same opportunities to enroll in advanced middle school and high school mathematics and science courses than their more affluent peers (Gaughan & Bozeman, 2015; Hill, Corbet, & St. Rose, 2010).

Beyond the obstacles students in poverty experience in school, future employment opportunities in STEM careers for individuals who are economically disadvantaged are inadequate. Gaughan and Bozeman (2015) described the hiring practices of people of poverty into fields of science and engineering as "pitiable," and for "underrepresented minorities who are also poor, working poor, or working class–the picture is bleaker still" (p. 27). In contrast, people who can enter careers as mathematics and science specialists enjoy higher salaries and have better job stability than employees in other fields (Hill et al., 2010).

III. Implications of Early Interest In STEM Careers

Maltese and Tai (2010) interviewed over 100 scientists and graduate students in science and discovered that 65% of those participants indicated that their interest in science began prior to middle school. In a different study, Tai, Liu, Maltese, and Fan (2006) suggested students who indicated an interest in a career in science in Grade 8 were three times more likely to pursue a degree in a science field than students who did not express an interest in science. In another study, Archer et al. (2010) recognized the importance of students aspiring to careers in STEM long before age 14. Indeed, in one study of over 1,000 STEM professionals, 28% of participants responded that they started considering a career in STEM before the age of 11, and 35% of participants started thinking of a STEM career between the ages of 12 and 14 (Archer, et al., 2010; Office for Public Management for the Royal Society, 2006).

IV. Purpose of the Study

The purpose of this study was to ascertain the extent to which differences, if any, were present in the STAAR Mathematics and Science test scores by student economic status. The STAAR Mathematics and Science test scores of Grade 5 students were analyzed to determine the extent to which differences were present between students who were economically disadvantaged and students who were not economically disadvantaged. Additionally, the STAAR Mathematics and Science test scores of Grade 8 students were examined to determine the extent to which differences were present based on student economic status.

V. Significance of this Study

Results from this investigation may be used to add to the existing literature, as no studies have been conducted in this area using the new STAAR assessments. Additionally, considerations regarding when STEM curriculum, instruction, and assessment are introduced to students might be influenced by the results of this study. Finally, school administrators, teachers, legislators, and organizations that contribute funds to expand STEM opportunities for students could use the findings of this study when they are envisioning policies and making decisions with respect to STEM education.

VI. Research Questions

The following research questions were addressed in this investigation: (a) What is the difference in Grade 5 STAAR Mathematics test performance as a function of student economic status (i.e., economically disadvantaged, not economically disadvantaged)?; (b) What is the difference in Grade 5 STAAR Science test performance as a function of student economic status (i.e., economically disadvantaged, not economically disadvantaged)?; (c) What is the difference in Grade 8 STAAR Mathematics test performance as a function of student economic status (i.e., economically disadvantaged, not economically disadvantaged)?; (d) What is the difference in Grade 8 STAAR Science test as a function of student economic status (i.e., economically disadvantaged, not economically disadvantaged)?; (e) What trend, if any, is present for Grade 5 the STAAR Mathematics test performance as a function of student economic status (i.e., economically disadvantaged, not economically disadvantaged) for the 2011-2012 through the 2014-2015 school years?; (f) What trend, if any, is present for Grade 5 STAAR Science test performance as a function of student economic status(i.e., economically disadvantaged, not economically disadvantaged) for the 2011-2012 through the 2014-2015 school years?; (g) What trend, if any, is present for Grade 8 STAAR Mathematics test performance as a function of student economic status (i.e., economically disadvantaged, not economically disadvantaged) for the 2011-2012 through the 2014-2015 school years?; and (h) What trend, if any, is present for Grade 8 STAAR Science test performance as a function of student economic status (i.e., economically disadvantaged, not economically disadvantaged) for the 2011-2012 through the 2014-2015 school years? The first four research questions were examined for four school years of data (i.e., 2011-2012, 2012-2013, 2013-2014, and 2014-2015), whereas the last four questions constituted trend questions across the four school years of data. Thus, 20 research questions are present in this research study.

VII. Method

a) *Research Design*

For this study an ex-post facto, non-experimental, causal-comparative research design was used (Creswell, 2009). No manipulation of the independent variable can occur due to the ex-post facto nature of the study. Archived datasets for the spring STAAR Mathematics and Sciences tests from the Texas Education Agency for the 2011-2012 through the 2014-2015 school years were obtained and examined. The independent variable in this study was student economic status. Economic disadvantaged refers to student status based on eligibility for free or reduced-price lunches as outlined in the National School Lunch program (Texas Department of Agriculture, n.d.). The dependent variables for this research study were the STAAR Mathematics and Science test scores for Grade 5 students and Grade 8 students for each of the 2011-2012 through the 2014-2015 school years.

b) *Participants and Instrumentation*

Grade 5 students and Grade 8 students enrolled in Texas public school were the participants in this study. Datasets were obtained from the Texas Education Agency Public Education Information Management System for the 2011-2012, 2012-2013, 2013-2014, and 2014-2015 school years. A Public Information Request form was sent to the Texas Education Agency to obtain these data. Specifically requested were data on (a) student economic status, (b) STAAR Mathematics test scores, and (d) STAAR Science test scores. Specifically, datasets were used to examine the degree to which differences were present on the STAAR Mathematics and Science tests by student economic status.

Raw scores on the Grade 5 and Grade 8 STAAR Mathematics and Science exams were analyzed in this investigation. Field (2009) reiterated that the measurement error be kept as low as possible via analysis of reliability and validity. Score reliability is the degree that a measurement tool yields stable and consistent results, and is therefore a fundamental in an assessment tool. Score validity refers to how well a test measures what it is professed to measure. According to the Texas Education Agency (2015), "reliability for the STAAR test score was estimated using statistical measures such as internal consistency, classical standard error of measurement, conditional standard error of measurement, and classification accuracy" (p. 113). The Texas Education Agency adheres to national standards of best practice and collects validity confirmation each year of the STAAR test scores.

VIII. Results

Prior to conducting inferential statistics to determine whether differences were present in the STAAR Mathematics and STAAR Science test scores between students who were economically disadvantaged and students who were not economically disadvantaged, checks were conducted to determine the extent to which these data were normally distributed (Onwuegbuzie & Daniel, 2002). Although some of the data were not normally distributed, a decision was made to use parametric independent samples *t*-tests to answer the research questions. Field (2009) contends that a parametric independent samples *t*-test is sufficiently robust that it can withstand this particular violation of its underlying assumptions. Statistical results will now be presented by academic subject area.

Research Question 1

For the 2011-2012 school year for Grade 5 students, the parametric independent samples *t*-test revealed a statistically significant difference in the STAAR Mathematics test scores by student economic status, $t(299126.40) = 177.76$, $p < .001$. This difference represented a moderate effect size (Cohen's *d*) of 0.60 (Cohen, 1988). Grade 5 students in poverty had an average STAAR Mathematics test score that was more than 6 points lower than their peers who were not economically disadvantaged. Readers are directed to Table 1 for the descriptive statistics for this analysis.

Table 1: Descriptive Statistics on the Grade 5 STAAR Mathematics Scores by Student Economic Status for the 2011-2012, 2012-2013, 2013-2014, and 2014-2015 School Years

School Year and Economic Status	*n*	*M*	*SD*
2011-2012			
Economically Disadvantaged	232,896	30.43	10.10
Not Economically Disadvantaged	141,085	36.47	10.04
2012-2013			
Economically Disadvantaged	230,798	30.59	10.60
Not Economically Disadvantaged	141,925	36.85	10.32
2013-2014			
Economically Disadvantaged	234,146	31.57	10.40
Not Economically Disadvantaged	145,212	37.45	9.96
2014-2015			
Economically Disadvantaged	230,800	28.36	10.55
Not Economically Disadvantaged	150,602	35.04	10.22

Regarding the 2012-2013 school year for Grade 5 students, the parametric independent samples *t*-test revealed a statistically significant difference in the STAAR Mathematics test scores by student economic status, $t(306441.87) = 177.98$, $p < .001$. This difference represented a moderate Cohen's *d* effect size of 0.60 (Cohen, 1988). Grade 5 students in poverty had an average STAAR Mathematics test score that was more than 6 points lower than their peers who were not economically disadvantaged. Included in Table 1 are the descriptive statistics for this analysis.

Concerning the 2013-2014 school year for Grade 5 students, the parametric independent samples *t*-test revealed a statistically significant difference in the STAAR Mathematics test scores by student economic status, $t(317881.83) = 173.66, p < .001$. This difference represented a moderate Cohen's *d* effect size of 0.58 (Cohen, 1988). Grade 5 students in poverty had an average STAAR Mathematics test score that was almost 6 points lower than their peers who were not economically disadvantaged. The descriptive statistics for this analysis are provided in Table 1.

For the 2014-2015 school year for Grade 5 students, a statistically significant difference was revealed in the STAAR Mathematics test scores by student economic status, $t(329043.68) = 195.02$, $p < .001$. This difference represented a moderate effect size (Cohen's *d*) of 0.64 (Cohen, 1988). Grade 5 students in poverty had an average STAAR Mathematics test score that was almost 7 points lower than their peers who were not economically disadvantaged. Descriptive statistics for this analysis are presented in Table 1.

Research Question 2

With respect to the 2011-2012 school year for Grade 5 students, the parametric independent samples *t*-test revealed a statistically significant difference in the STAAR Science test scores by student economic status, $t(320251.25) = 200.40$, $p < .001$. This difference represented a moderate effect size (Cohen's *d*) of 0.67 (Cohen, 1988). Grade 5 students in poverty had an average STAAR Science test score that was almost 5 points lower than their peers who were not economically disadvantaged. Included in Table 2 are the descriptive statistics for this analysis.

Table 2: Descriptive Statistics on the Grade 5 STAAR Science Scores by Student Economic Status for the 2011-2012, 2012-2013, 2013-2014, and 2014-2015 School Years

School Year and Economic Status	*n*	*M*	*SD*
2011-2012			
Economically Disadvantaged	233,096	30.09	7.53
Not Economically Disadvantaged	140,745	34.88	6.80
2012-2013			
Economically Disadvantaged	230,868	27.54	7.67
Not Economically Disadvantaged	141,550	33.29	7.22

2013-2014			
Economically Disadvantaged	233,821	27.88	7.91
Not Economically Disadvantaged	145,371	33.03	7.15
2014-2015			
Economically Disadvantaged	235,318	27.21	8.19
Not Economically Disadvantaged	153,918	32.60	7.66

Concerning the 2012-2013 school year for Grade 5 students, a statistically significant difference was revealed in the STAAR Science test scores by student economic status, $t(313342.45) = 204.35$, $p < .001$. This difference represented a moderate Cohen's d effect size of 0.68 (Cohen, 1988). Grade 5 students in poverty had an average STAAR Science test score that was more than 5 points lower than their peers who were not economically disadvantaged. The descriptive statistics for this analysis are provided in Table 2.

For the 2013-2014 school year for Grade 5 students, a statistically significant difference was yielded in the STAAR Science test scores by student economic status, $t(331415.55) = 206.92$, $p < .001$. This difference represented a Cohen's d of 0.68, a moderate effect size (Cohen, 1988). Grade 5 students in poverty had an average STAAR Science test score that was more than 5 points lower than their peers who were not economically disadvantaged. Readers are directed to Table 2 for the descriptive statistics related to this analysis.

Regarding the 2014-2015 school year for Grade 5 students, a statistically significant difference was revealed in the STAAR Science test scores by student economic status, $t(344412.34) = 208.86$, $p < .001$. This difference represented a moderate effect size (Cohen's d) of 0.68 (Cohen, 1988). Grade 5 students in poverty had an average STAAR Science test score that was more than 5 points lower than their peers who were not economically disadvantaged. Descriptive statistics related to this analysis are provided in Table 2.

Research Question 3

Concerning the 2011-2012 school year for Grade 8 students, the parametric independent samples *t*-test revealed a statistically significant difference in the STAAR Mathematics test scores by student economic status, $t(271480.68) = 186.95$, $p < .001$. This difference represented a moderate Cohen's d effect size of 0.67 (Cohen, 1988). Grade 8 students in poverty had an average STAAR Mathematics test score that was more than 7 points lower than their peers who were not economically disadvantaged. Revealed in Table 3 are the descriptive statistics for this analysis.

Table 3: Descriptive Statistics on the Grade 8 STAAR Mathematics Scores by Student Economic Status for the 2011-2012, 2012-2013, 2013-2014, and 2014-2015 School Years

School Year and Economic Status	*n*	*M*	*SD*
2011-2012			
Economically Disadvantaged	194,864	27.02	10.24
Not Economically Disadvantaged	133,783	34.18	11.13
2012-2013			
Economically Disadvantaged	186,578	27.54	9.92
Not Economically Disadvantaged	116,307	33.29	10.71
2013-2014			
Economically Disadvantaged	190,056	28.56	10.55
Not Economically Disadvantaged	127,749	35.21	11.12
2014-2015			
Economically Disadvantaged	197,900	28.20	9.97
Not Economically Disadvantaged	128,658	33.97	10.56

For the 2012-2013 school year for Grade 8 students, a statistically significant difference was yielded in the STAAR Mathematics test scores by student economic status, $t(232486.03) = 147.88$, $p < .001$. This difference represented a moderate effect size (Cohen's d) of 0.56 (Cohen, 1988). Grade 8 students in poverty had an average STAAR Mathematics test score that was over 5 points lower than their peers who were not economically disadvantaged. The descriptive statistics for this analysis are provided in Table 3.

Regarding the 2013-2014 school year for Grade 8 students, a statistically significant difference was present in the STAAR Mathematics test scores by student economic status, $t(262627.24) = 169.70$, $p < .001$. This difference represented a Cohen's d of 0.61, a moderate effect size (Cohen, 1988). Grade 8 students in poverty had an average STAAR Mathematics test score that was over 6 points lower than their peers who were not economically disadvantaged. Presented in Table 3 are the descriptive statistics for this analysis.

Concerning the 2014-2015 school year for Grade 8 students, a statistically significant difference was yielded in the STAAR Mathematics test scores by student economic status, $t(263455.66) = 156.04$, $p <$

.001. This difference represented a moderate effect size (Cohen's *d*) of 0.56 (Cohen, 1988). Grade 8 students in poverty had an average STAAR Mathematics test score that was almost 6 points lower than their peers who were not economically disadvantaged. The descriptive statistics for this analysis are provided in Table 3.

Research Question 4

For the 2011-2012 school year for Grade 8 students, the parametric independent samples *t*-test revealed a statistically significant difference in the STAAR Science test scores by student economic status, $t(321213.02) = 201.47$, $p < .001$. This difference represented a moderate Cohen's *d* effect size of 0.68 (Cohen, 1988). Grade 8 students in poverty had an average STAAR Science test score that was almost 7 points lower than their peers who were not economically disadvantaged. Readers are directed to Table 4 for the descriptive statistics for this analysis.

Table 4: Descriptive Statistics on the Grade 8 STAAR Science Scores by Student Economic Status for the 2011-2012, 2012-2013, 2013-2014, and 2014-2015 School Years

School Year and Economic Status	*n*	*M*	*SD*
2011-2012			
Economically Disadvantaged	206,532	30.18	9.60
Not Economically Disadvantaged	149,950	36.78	9.69
2012-2013			
Economically Disadvantaged	210,494	30.94	9.73
Not Economically Disadvantaged	152,301	37.49	9.82
2013-2014			
Economically Disadvantaged	217,768	31.78	10.53
Not Economically Disadvantaged	157,641	38.72	10.33
2014-2015			
Economically Disadvantaged	225,242	31.92	10.64
Not Economically Disadvantaged	166,501	38.11	10.80

Regarding the 2012-2013 school year for Grade 8 students, a statistically significant difference was yielded in the STAAR Science test scores by student economic status, $t(326231.18) = 199.29$, $p < .001$. This difference represented a moderate effect size (Cohen's *d*) of 0.67 (Cohen, 1988). Grade 8 students in poverty had an average STAAR Science test score that was almost 7 points lower than their peers who were not economically disadvantaged. Revealed in Table 4 are the descriptive statistics for this analysis.

Concerning the 2013-2014 school year for Grade 8 students, a statistically significant difference was present in the STAAR Science test scores by student economic status, $t(343406.26) = 201.67$, $p < .001$. This difference represented a moderate effect size (Cohen's *d*) of 0.67 (Cohen, 1988). Grade 8 students in poverty had an average STAAR Science test score that was almost 7 points lower than their peers who were not economically disadvantaged. Readers are directed to Table 4 for the descriptive statistics for this analysis.

For the 2014-2015 school year for Grade 8 students, the parametric independent samples *t*-test revealed a statistically significant difference in the STAAR Science test scores by student economic status, $t(355685.02) = 178.60$, $p < .001$. This difference represented a Cohen's *d* of 0.58, a moderate effect size (Cohen, 1988). Grade 8 students in poverty had an average STAAR Science test score that was over 6 points lower than their peers who were not economically disadvantaged. The descriptive statistics for this analysis are provided in Table 4.

Research Question 5

For the 2011-2012 through the 2014-2015 school years, the STAAR Mathematics scores of Grade 5 students by economic status (i.e., economically disadvantaged and not economically disadvantaged) were analyzed. Statistically significant differences by student economic status were present in all four school years. Figure 1 is a representation of student performance by economic status for the 2011-2012 through the 2014-2015 school years. Students who were economically disadvantaged as well as students who were not poor had improved test performance from the 2011-2012 through the 2013-2014 school years. Of note was that the average test scores for both groups of students were the lowest in the 2014-2015 school year. Students who were not poor had higher average test scores than did students who were poor in all four school years.

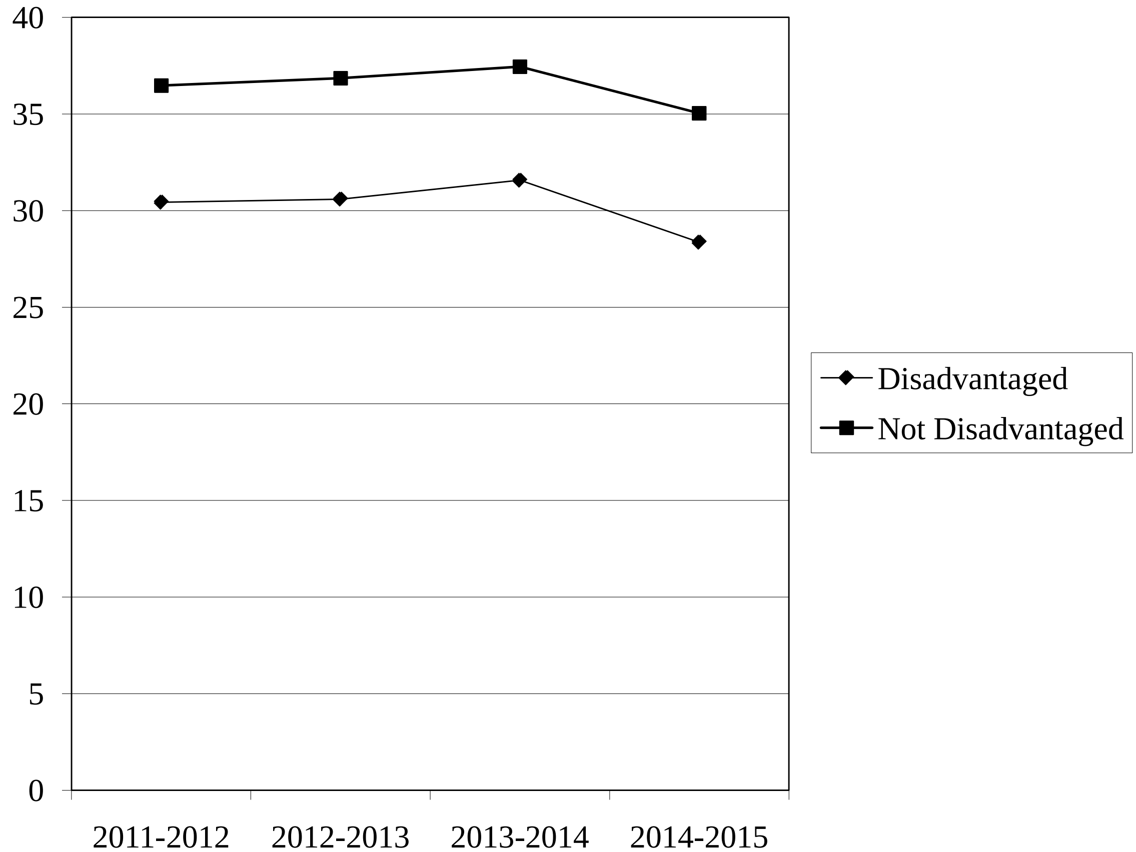

Figure 1: Average raw scores by student economic status for the Grade 5 State of Texas Assessment of Academic Readiness Mathematics test for the 2011-2012 through the 2014-2015 school years.

Research Question 6

For the 2011-2012 through the 2014-2015 school years, the STAAR Science scores of Grade 5 students by economic status (i.e., economically disadvantaged and not economically disadvantaged) were analyzed. Statistically significant results were revealed for all four school years. Represented in Figure 2 are the average test scores by economic status for these four school years. Students who were poor as well as students who were not poor had lower test performance from the 2011-2012 through the 2014-2015 school years, with the exception of the 2013-2014 school year. In that school year, students who were not economically disadvantaged had an average test score that was only 0.03 points higher than the previous school year. Students who were not poor had better performance in all four school years than did their peers who were economically disadvantaged.

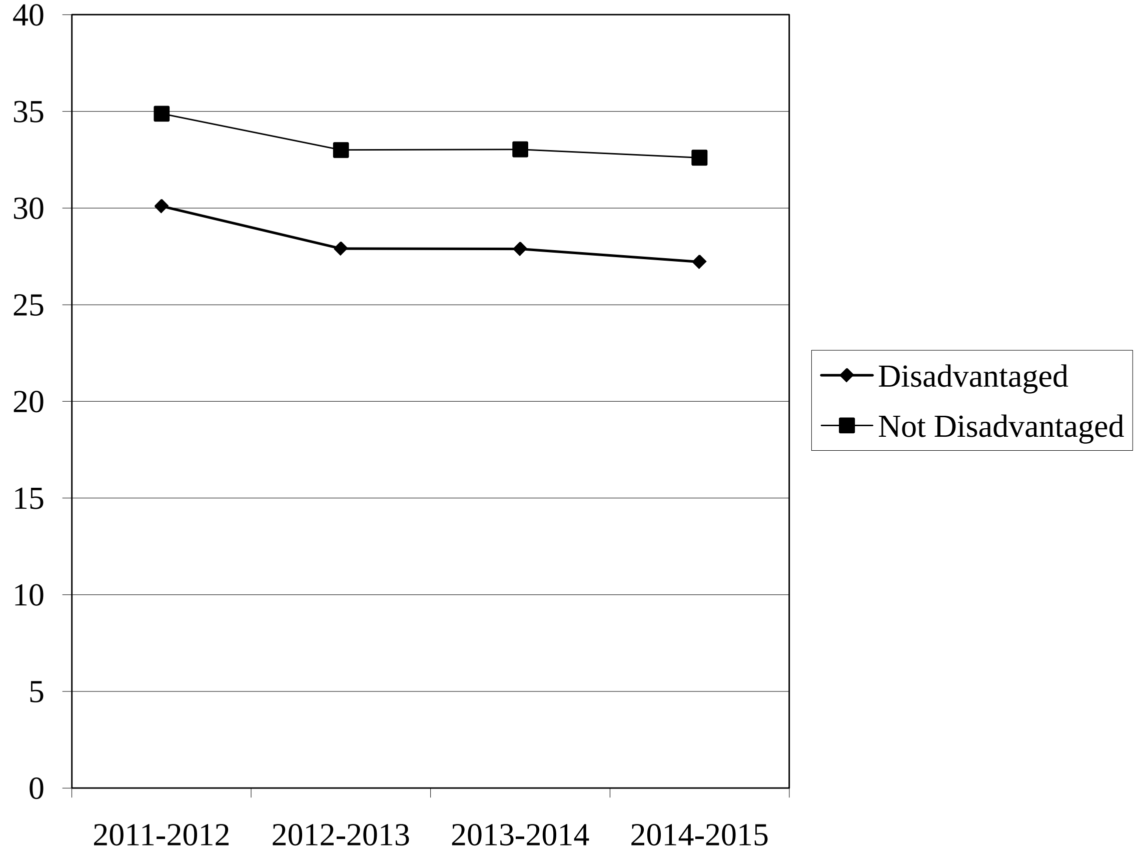

Figure 2: Average raw scores by student economic status for the Grade 5 State of Texas Assessment of Academic Readiness Science test for the 2011-2012 through the 2014-2015 school years

Research Question 7

For the 2011-2012 through the 2014-2015 school years, the STAAR Mathematics scores of Grade 8 students by economic status (i.e., economically disadvantaged and not economically disadvantaged) were analyzed. Statistically significant differences were yielded in each of the four school years. Figure 3 is a representation of student achievement by economic status. Average test scores during the 2012-2013 school year were lower than the scores in the 2011-2012 school year for students of economic advantage; however, test scores were slightly higher for students of economic disadvantage. An increase in the average test scores was present for both groups in the 2013-2014 school year, and a decrease for both groups was present in the 2014-2015 school year. The average test score difference between the two student groups varied each year, with students who were economically disadvantaged scoring lower than students who were not economically disadvantaged in the 2011-2012 through 2014-2015 school years.

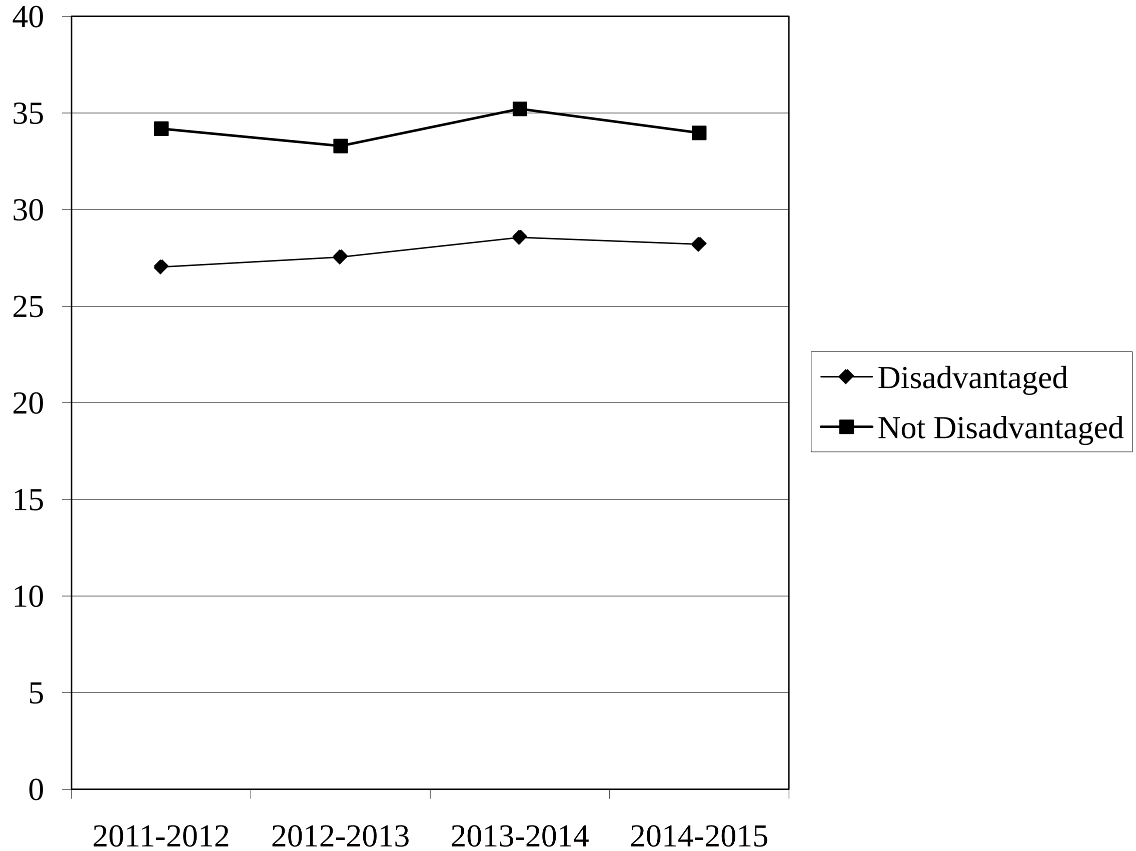

Figure 3: Average raw scores by student economic status for the Grade 8 State of Texas Assessment of Academic Readiness Mathematics test for the 2011-2012 through the 2014-2015 school years.

Research Question 8

For the 2011-2012 through the 2014-2015 school years, differences in the STAAR Science scores of Grade 8 students by economic status (i.e., economically disadvantaged and not economically disadvantaged) were analyzed. Of the four school years investigated, all years had statistically significant results. Figure 4 is a representation of test performance by economic status. Students who were economically disadvantaged and students who were not economically disadvantaged had slightly improved average scores each year from the 2011-2012 through the 2014-2015 school years, except for the 2014-2015 school year. In that school year, students who were not economically disadvantaged attained an average score slightly lower than the average score in the 2013-2014 school year. Students who were not economically disadvantaged outscored students who were economically disadvantaged in every year of the study.

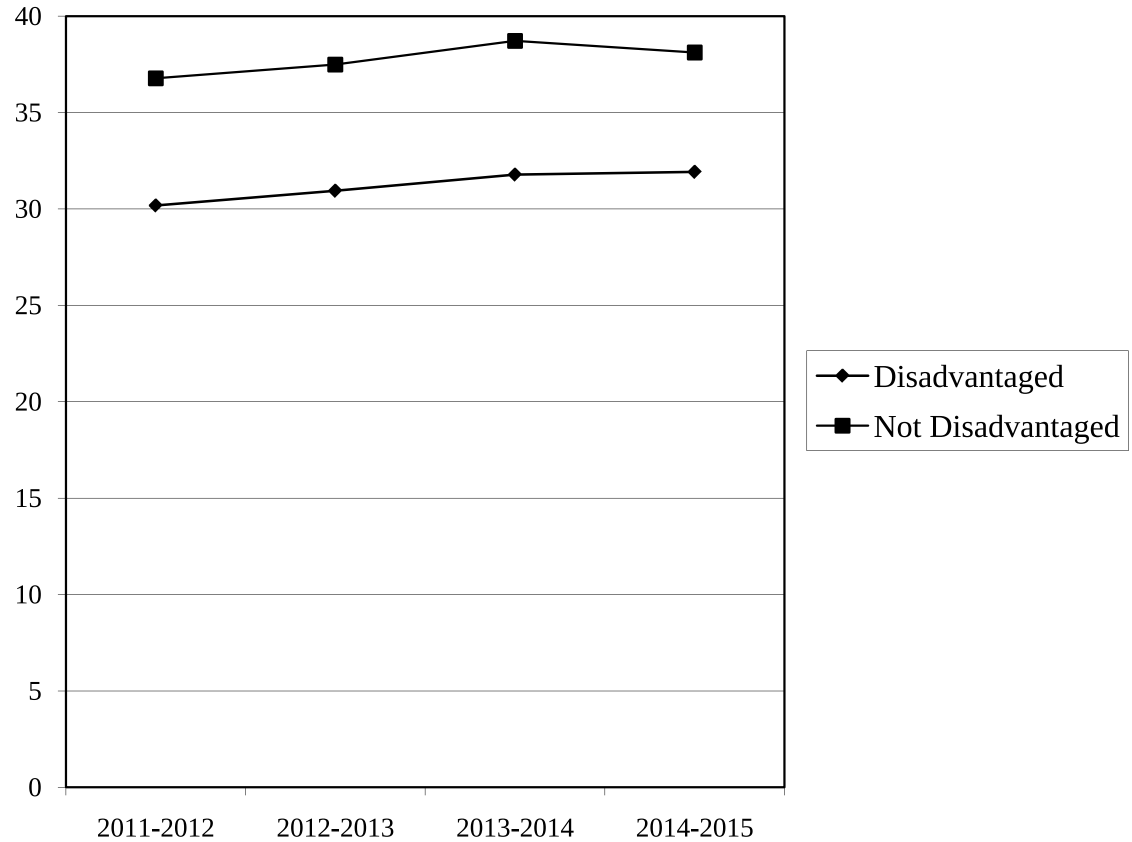

Figure 4: Average raw scores by student economic status for the Grade 8 State of Texas Assessment of Academic Readiness Science test for the 2011-2012 through the 2014-2015 school years.

IX. Discussion

The purpose of this study was to determine the degree to which STAAR Mathematics and Science test scores for Grade 5 students and Grade 8 students differed as a function of economic status (i.e., economically disadvantaged, not economically disadvantaged). To determine if differences existed in STAAR Mathematics and Science test scores related to student economic disadvantage, independent samples *t*-tests were used. Four years of Texas, statewide individual level student data were obtained and analyzed for this investigation.

Regarding the STAAR Mathematics Scores for Grade 5, students who were economically disadvantaged had lower average scores than students who were not economically disadvantaged during all four years of the study. Average score differences ranged from 5.88 to 6.69 points. The largest average difference between students who were economically disadvantaged and students who were not economically disadvantaged was in the 2014-2015 school year.

Students in Grade 5 who were economically disadvantaged had lower average scores than students who were not economically disadvantaged on the STAAR Science Scores each year of the study. Students who were not economically disadvantaged outscored students who were economically disadvantaged by between 4.79 and 5.39 points. As evidenced in the Grade 5 STAAR Mathematics Scores results, the gap by economic status in average scores was the largest in the 2014-2015 school year.

Regarding the Grade 8 STAAR Mathematics exam, students who were economically disadvantaged had lower average scores than students who were not disadvantaged for all four years of the study (i.e., 2011-2012, 2012-2013, 2013-2014, and 2014-2015). The average score difference based on economic status was between between 5.74 and 7.15 points. Furthermore, the largest achievement gap between student groups was in the 2011-2012 school year with a difference of 7.15 average points.

Regarding the Grade 8 STAAR Science exam, students who were economically disadvantaged had average scores that were lower than students who were not economically disadvantaged all four years of the study. The average difference each year of the study ranged from 6.20 and 6.95 points. The largest average difference in test scores occurred in the 2012-2014 school year.

a) Connections with Existing Literature

As a result of this study, the existing student poverty research (Beatty, 2013; Farmbry, 2014; Gotfried & Williams, 2013) is reinforced. The average scores of students who were economically disadvantaged were always lower than their more affluent counterparts by several points for Grade 5 Mathematics and Science exams. Additionally, Grade 8 students who were economically disadvantaged had average scores that were several points lower than students who were not economically disadvantaged in both STAAR Mathematics and Science tests for all years of the study.

b) Implications for Policy and Practice

In this multiyear analysis of average raw scores of Grade 5 and Grade 8 STAAR Mathematics and Science exams, students who were economically disadvantaged outscored students who were not economically disadvantaged by several points on almost every exam. Educational policymakers should consider new strategies for improving STEM instruction and assessment. Currently, test results from assessments such as the STAAR Mathematics and STAAR Science exams are referenced by researchers as if they are a true reflection of what is learned in the science and mathematics classroom. In reality, the STAAR exams measure merely a small portion of what is taught; and, the multiple choice format is too restrictive to give a more accurate reflection of the critical thinking skills required of students today.

c) Recommendations for Educational Leaders

Policymakers are encouraged to write and fund a state level STEM curriculum that includes project-based, hands-on learning that simulates real world experiences. School and district leaders are encouraged to advocate for multidisciplinary lessons that include many opportunities for students to engage in real-life problem solving skills for all students. Similarly, educational leaders should consider assessments that measure critical thinking skills, rather than rote memorization. Additionally, school leaders should encourage students who are economically disadvantaged to participate in challenging STEM programs both during school, and outside of normal school hours.

d) Recommendations for Future Research

In this study, the STAAR Mathematics and STAAR Science test scores were analyzed by student economic status for Grade 5 students and Grade 8 students for the 2011-2012, 2012-2013, 2013-2014, and 2014-2015 school years. Results were consistent throughout each year of study for most tests, with students who were not economically disadvantaged outscoring students who were economically disadvantaged by several points. Researchers may wish to continue measuring the differences in test scores based on economic status to determine if the achievement gap will close in future assessment years. Analyzed in this study were data for the Grade 5 and Grade 8 STAAR Mathematics and Science test scores of Texas public school students. Researchers are encouraged to analyze student cademic achievement at other grade levels, such as Grade 3 which is the first year in which Texas school students are administered the statewide mandated assessment, as well as high school students who are required to take End-of-Course exams. Researchers are encouraged to extend this empirical investigation to other states to ascertain the degree to which results delineated herein are generalizable.

X. Conclusion

The purpose of this research study was to examine the extent to which differences existed in STAAR Mathematics and STAAR Science scores for Grade 5 and Grade 8 students. Data were analyzed for four years of data (i.e., the 2011-2012, 2012-2013, 2013-2014, and 2014-2015 school years). Statistically significant differences were present in both tests for all four years of data. During each year of data, students who were economically disadvantaged consistently had lower average test scores than students who were not economically disadvantaged. This study is important to STEM learning because the achievement gap between students who are economically disadvantaged and students who are not economically disadvantaged still exists 50 years after President Lyndon Johnson declared a War on Poverty, and more attention to curriculum, instruction, and assessment designed to promote higher achievement in STEM area is warranted.

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