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Abstract

Analyzed in this study were the State of Texas Assessment of Academic Readiness (STAAR) Mathematics and Science raw scores for Grade 5 students to determine the degree to which gender and ethnic/racial (i.e., Asian, Black, Hispanic, and White) differences were present. Four school years (i.e., 2011-2012 through 2014-2015) of statewide data were analyzed. For all tests, statistically significant differences were present by gender and by ethnicity/race. Trivial effect sizes were present between boys and girls for each analysis. However, medium effect sizes were revealed with regard to the raw score differences by ethnicity/race for the four years analyzed. Every year, Asian students had the highest average test score, followed by White, Hispanic, and Black students, respectively. A stair-step achievement gap (Carpenter, Ramirez, Seven, 2006) was present in each school year analyzed.

Index terms— science achievement, mathematics achievement, asian, black, hispanic, white, gender, problem-based learning, stem.

Engineering, and Math (STEM) professionals. The U.S. Department of Labor reported that 90% of the fastest growing employment fields in 2018 will demand at least a bachelor's degree with considerable instruction in mathematics and science (Hill, Corbett, & St. Rose, 2010). Employment in science and engineering will grow more swiftly than all other occupations, especially in engineering and computerrelated fields. People who take advantage of these career fields as mathematics and science specialists will enjoy higher salaries and have better job stability than employees in other fields (Hill et al., 2010). Contradictory to the nation's need for STEM expertise, however, researchers (Atkinson, 2012; My College Options & STEM connector, 2013; President's Council of Advisors on Science and Technology [PCAST], 2010; Tank, 2014) acknowledged that American workers are not prepared to meet the needs of current STEM positions. Over one half of students who graduate with a science or engineering degree within the United States are from other countries **??**PCAST, 2010).

According to the National Science Foundation (NSF), science, technology, engineering, and mathematics are referenced as STEM disciplines (Koonce, Zhou, Anderson, Hening, & Conley, 2011). Education advocates have hailed STEM as a key program in the educational reform movement, and activists, politicians, and science and engineering proponents have been attracted to the idea of STEM education (Atkinson, 2012; The Whitehouse, 2015).

National organizations and business leaders have suggested an increased demand for science, technology, engineering, and mathematics (STEM) skills programs (National Research Council [NRC], 2011). Although this demand has increased, the intent and execution of the STEM curriculum is unclear and needs further interpretation (Bybee, 2013;Koonce et al., 2011). Moreover, the increased emphasis on elementary reading and mathematics skills has been on the political radar in the United States since the No Child Left Behind Act was issued in 2001 **??**Sikma & Osborne, 2014). As a result, instructional time has increasingly been devoted to basic skills rather than to science **??**Sikma & Osborne, 2014).

A particular challenge to STEM reform is the way that successes in STEM learning are assessed. Although STEM learning should include deeper analysis and critical thinking in all fields of science, technology, engineering, and mathematics, assessments to measure STEM knowledge are often determined through mathematics and science scores alone ??NRC, 2011). Unfortunately, standardized tests, such as state, national, and international assessments, are the recognized norm for students to demonstrate academic prowess in science and mathematics (Bleich, 2012; ??RC, 2011).

The State of Texas Assessment of Academic Readiness (STAAR) tests are administered to students in Texas public schools to assess student college and career readiness, and to satisfy state and federal accountability requirements in several core subjects. Each school year STAAR Mathematics tests are given in Grades 3-8, and STAAR Science tests are administered in Grades 5 and 8.

Students from the United States have historically scored lower in international assessments than students from other countries (Fleischman, Hopstock, Pelczar, & Shelley, 2010). In an assessment given to 15-year-old students, the United States ranked 35th in mathematics and 27th in science on the 2012 Program for International Student Assessment (De Silver, 2015). In another international assessment, U.S. students performed 27th in mathematics and 20th in science among the 34 countries that make up the Organization for Economic Cooperation and Development (De Silver, 2015). In addition to American students ranking lower than students from other countries in mathematics and science, American students are also graduating with STEM-related degrees at a much lower rate than students from other countries (NRC, 2011; Newman et al., 2015).

According to a report on the National Assessment of Educational Progress (NAEP), many high school graduates do not meet the standards for subject matter knowledge and analytical skills required for college-level studies (Venezia & Jaeger, 2013). Therefore, some advocates (e.g., Mac Ewan, 2013; Tank, 2014) of STEM learning recommended learners experience authentic, real-world connections to science and mathematics as averages of increasing knowledge and analytical skills. However, this approach is seldom used in classrooms ??Tank, 2014).

Another issue that may contribute to a lack of participation in STEM degrees was reported by The National Science Board (2014). One half of first-time college students in the United States enrolled in some type of remedial course, and 42% of all college students needed at least one remedial mathematics course (National Science Board, 2014). Researchers (e.g., Gigliotti, 2012 (Gonzalez & Kuenzi, 2013). This lack of interest continues to be a concern for educators and government organizations (Diaz-Rubio, 2013; PCAST, 2010).

Additionally, an achievement gap persists among certain minority groups (e.g., Black and Hispanic) and students who are White (Chatterji, 2006;Christian, 2008; ??CAST, 2010).

Although the achievement gap between Black students and White students has narrowed since 1990, White students continue to outscore Black students by 26 points on the 2013 NAEP Mathematics assessments. No measurable decrease in the gap between White and Hispanic students was noted during that time (National Center for Education Statistics [NCES], 2016). Educational policymakers remain concerned about the consistent achievement gaps between White students and Black students and Hispanic students (PCAST, 2010). One positive approach has emerged; the increasing appearance of magnet schools has offered extraordinary opportunities for underrepresented students to study specific educational themes such as STEM ??Sikma & Osborne, 2014).II.

1 Purpose of the Study

The purpose of this study was to determine the degree to which boys and girls differ in their performance on the STAAR Mathematics and Science tests.

Specifically analyzed were the STAAR Mathematics and Science test scores to determine whether differences exist in the test scores between Grade 5 boys and girls. A second purpose of this study was to determine the degree to which Asian, Black, Hispanic, and White Grade 5 students performed differently on the STAAR Mathematics and Science tests.

2 III.

3 Significance of the Study

Currently, no published articles exist in which the relationships of gender and ethnicity/race to performance on the STAAR Mathematics and Science tests for Grade 5 students have been addressed. The extent to which gender and ethnic/racial gaps documented on previous assessments would be generalizable to the new state-mandated assessment, the STAAR, is not known. Accordingly, it is important to ascertain the presence, if any, of achievement gaps on the STAAR Mathematics and Science assessments for Grade 5 students by their gender and ethnicity/race. Such information would be useful to determine the efficacy of any new interventions or program in the STEM curriculum and instruction. School administrators, teachers, and legislators could use the findings of this study when they envision policies and make decisions with respect to STEM education.

4 Research Questions

The following research questions were addressed in this investigation: (a) What is the difference between ??rade 5

5 Method a) Research Design

For this study a non-experimental, causalcomparative research design was used ??Creswell, 2009). Both the independent and dependent variables constitute past events. Due to the ex-post facto nature of the data, neither the independent variables nor the dependent variables could be manipulated. Archival datasets for the spring STAAR test scores from the Texas Education Agency Public Education Information Management System were obtained and analyzed for four school years (i.e., ??011-2012, 2012-2013, 2013-2014, and 2014-2015). The independent variables analyzed were student gender and ethnicity/race. The dependent variables were the Grade 5 STAAR Mathematics and Science test scores for boys and girls and by ethnic/racial membership.

6 b) Participants and Instrumentation

Texas students in Grade 5 who were Asian, Black, Hispanic, or White were the participants in this study.

Datasets were obtained from the Texas Education Agency Public Education Information Management System for the 2011-2012 school year through the 2014-2015 school year.

A Public Information Request form was sent to the Texas Education Agency to obtain these data. Data were requested for (a) student gender, (b) student ethnicity/race, (c) STAAR Mathematics test scores, and (d) STAAR Science test scores.

Raw scores on the Grade 5 STAAR Mathematics and Science exams were analyzed in this investigation. Field (2009) reiterated the importance of test score reliability and test score validity. 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.For more detailed information on the psychometric qualities of the STAAR tests, readers are referred to the Texas Education Agency website.

V.

7 Results

Prior to conducting inferential statistics to determine whether differences were present in the STAAR Mathematics and STAAR Science test scores between boys and girls and among ethnic/racial groups (i.e., Asian, Black, Hispanic, and White), 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) contended 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 and by school year.

8 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 gender, t(374086.60) = 14.21, p< .001. This difference represented a trivial effect size (Cohen's d) of 0.05 (Cohen, 1988). Grade 5 girls had an average STAAR Mathematics test score that was less than 1 point higher than Grade 5 boys. Revealed in Table 1 are the descriptive statistics for this analysis. This difference represented a trivial Cohen's d effect size of 0.01 (Cohen, 1988). Grade 5 girls had an average STAAR Mathematics test score that was less than 1 point higher than boys. Presented in Table1 are the descriptive statistics for this analysis.

Concerning the 2013-2014 school year for Grade 5 students, a statistically significant difference was revealed in the STAAR Mathematics test scores by student gender, t(379411.90) = 10.84, p< .001. This difference represented a trivial effect size (Cohen's d) of 0.03 (Cohen, 1988). Grade 5 girls had an average STAAR Mathematics test score that was less than 1 point higher than Grade 5 boys. The descriptive statistics for this analysis are presented 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 gender, t(381323.33) = 22.20, p< .001. This difference represented a trivial Cohen's d effect size of 0.07 (Cohen, 1988). Grade 5 girls had an average STAAR Mathematics test score that was almost 1 point higher than Grade 5 boys. Readers are directed to Table 1 for the descriptive statistics for this analysis.

9 Research Question 2

With respect to the 2011-2012 school year for Grade 5 students, a statistically significant difference was yielded in the STAAR Science test scores by student gender, t(373663.23) = 36.69, p< .001. This difference represented a trivial effect size (Cohen's d) of 0.12 (Cohen, 1988). Grade 5 girls had an average STAAR Science test score that was almost 1 point lower than Grade 5 boys. Presented in Table 2 are the descriptive statistics for this analysis. Concerning the 2012-2013 school year for Grade 5 students, a statistically significant difference was yielded in the STAAR Science test scores by student gender, t(372382.95) = 37.92, p< .001. This difference represented a trivial Cohen's d effect size of 0.12 (Cohen, 1988). Grade 5 girls had an average STAAR Science test score that was almost 1 point lower than Grade 5 boys. The descriptive statistics for this analysis are revealed in Table 2.

With respect to the 2013-2014 school year for Grade 5 students, a statistically significant difference was present in the STAAR Science test scores by student gender, t(379068.90) = 37.92, p< .001. This difference represented a Cohen's d of 0.10, a trivial effect size (Cohen, 1988). Grade 5 girls had an average STAAR Science test score that was almost 1 point lower than Grade 5 boys. Readers are directed to Table 2 for the descriptive statistics for 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 gender, t(389220.21) = 18.00, p< .001. This difference represented a trivial effect size (Cohen's d) of 0.06 (Cohen, 1988). Grade 5 girls had an average STAAR Science test score that was less than 1 point lower than Grade 5 boys. In Table 2 are the descriptive statistics for this analysis.

10 Research Question 3

To address the third and fourth research questions, an Analysis of Variance (ANOVA) procedure was calculated. Prior to conducting the ANOVA, checks for normality of data were conducted. With respect to the distribution of Grade 5 STAAR Mathematics test scores by ethnicity/race, the standardized skewness coefficients (i.e., skewness divided by the standard error of skewness) and the standardized kurtosis coefficients (i.e., kurtosis divided by the standard error of kurtosis) revealed departures from normality for the variable of interest as the standardized coefficients were not within the +/-3 range (Onwuegbuzie & Daniel, 2002). To check further for homogeneity of variance, Levene's test was performed and revealed a violation of this assumption. Field (2009), however, contends that the parametric ANOVA is sufficiently robust that these violations can be withstood.

For the 2011-2012 school year, a statistically significant difference was revealed in Grade 5 STAAR Mathematics test scores by ethnicity/race, F(3, 365881) = 8405.30, p< .001, partial ? 2 = .064, a medium effect size (Cohen, 1988). Scheffe' post hoc procedures were used to determine which ethnic/racial groups differed from each other. As evidenced in Table 3, Asian students had the highest average STAAR Mathematics scores, followed by White, Hispanic, and Black students, respectively. Moreover, an achievement gap between Asian students and Hispanic students was revealed, and a larger achievement gap existed between Asian and Black students. Thus, a stair-step achievement gap by ethnicity/race (Carpenter, Ramirez, & Severn, 2006) was clearly evident. Readers are directed to Table 3 for the descriptive statistics. Regarding the 2012-2013 school year for Grade 5 students, a statistically significant difference was revealed in Grade 5 STAAR Mathematics test scores by ethnicity/race, F(3, 364407) = 8728.25, p< .001, partial ? 2 = .067, a medium effect size (Cohen, 1988). Scheffe' post hoc procedures were used to determine which ethnic/racial groups differed from each other. As evidenced in Table 3.3, Asian students had the highest average STAAR Mathematics scores, followed White, Hispanic, and Black students, respectively. Moreover, an achievement gap between Asian and Hispanic students was revealed, and a larger achievement gap existed between Asian and Black students. Clearly a stair-step achievement gap (Carpenter et al., 2006) was present with regard to ethnicity/race. Revealed in Table 3 are the descriptive statistics this analysis.

Concerning the 2013-2014 school year, a statistically significant difference was revealed in Grade 5 STAAR Mathematics test scores by ethnicity/race, F(3, 370292) = 7833.87, p< .001, partial ? 2 = .06, a medium effect size (Cohen, 1988).

Scheffe' post hoc procedures were used to determine which ethnic/racial groups differed from each other. As reported in Table 3, Asian students had the highest average STAAR Mathematics scores, followed by White, Hispanic, and Black students, respectively. Moreover, an achievement gap between Asian and Hispanic students was revealed, and a larger achievement gap existed between Asian and Black students. Thus, a stair-step achievement gap by ethnicity/race (Carpenter et al., 2006) was clearly evident.

Table 3 contains the descriptive statistics for this analysis.

For the 2014-2015 school year, a statistically significant difference was revealed in Grade 5 STAAR Mathematics test scores by ethnicity/race, F(3, 371951) = 11118.25, p< .001, partial ? 2 = .082, a medium effect size (Cohen, 1988). Scheffe' post hoc procedures were used to determine which ethnic/racial groups differed from each other. As evidenced in Table 3, Asian students had the highest average STAAR Mathematics scores, followed by White, Hispanic, and Black students, respectively. Moreover, an achievement gap between Asian and Hispanic students was revealed, and a larger achievement gap existed between Asian and Black students. In agreement with Carpenter et al. (**??**006) a stair-step achievement gap was clearly evident. Revealed in Table 3 are the descriptive statistics for this analysis.

11 Research Question 4

Regarding the 2011-2012 school year for Grade 5 students, a statistically significant difference was revealed in Grade 5 STAAR Science test scores by ethnicity/race, F(3, 365711) = 10445.44, p< .001, partial ? 2 = .079, a medium effect size (Cohen, 1988). Scheffe' post hoc procedures revealed that Asian students had the highest average STAAR Mathematics scores, followed by White, Hispanic, and Black students, respectively. Not only was an achievement gap present between Asian and Hispanic students, an even larger achievement gap existed between Asian and Black students. Thus, revealed in this analysis was a stair-step achievement gap (Carpenter et al., 2006). Readers are directed to Table 4 for the descriptive statistics for this analysis. Concerning the 2012-2013 school year, a statistically significant difference was revealed in Grade 5 STAAR Science test scores by ethnicity/race, F(3, 364086) = 11654.21, p< .001, partial ? 2 = .088, a medium effect size (Cohen, 1988). Scheffe‘ post hoc procedures revealed that Asian students had the highest average STAAR Science scores, followed by White, Hispanic, and Black students, respectively. Not only was an achievement gap present between Asian and Hispanic students, an even larger achievement gap existed between Asian and Black students. Revealed in this analysis was a stair-step achievement gap (Carpenter et al., 2006). Presented in Table 4 are the descriptive statistics for this analysis.

For the 2013-2014 school year, a statistically significant difference was revealed in Grade 5 STAAR Science test scores by ethnicity/race, F(3, 370121) = 11927.73, p< .001, partial ? 2 = .088, a medium effect size (Cohen, 1988). Scheffe‘ post hoc procedures revealed that Asian students had the highest average STAAR Science scores, followed by White, Hispanic, and Black students, respectively. Consistent with the previous school years, a stair-step achievement gap was revealed (Carpenter et al., 2006). Descriptive statistics for this analysis are presented in Table 4.

Regarding the 2014-2015 school year for Grade 5 students, a statistically significant difference was revealed in Grade 5 STAAR Science test scores by ethnicity/race, F(3, 379583) = 12234.20, p< .001, partial ? 2 = .088, a medium effect size (Cohen, 1988). Scheffe‘ post hoc procedures revealed that Asian students had the highest average STAAR Science scores, followed by, in rank order, White, Hispanic, and Black students. As such, clearly present in this analysis was a stair-step achievement gap (Carpenter et al., 2006). Revealed in Table 4 are the descriptive statistics for this school year.

12 Research Question 5

For the 2011-2012 through the 2014-2015 school years, differences in the STAAR Mathematics scores of Grade 5 students for boys and girls were analyzed. Of the 4 years investigated, results from all years were statistically significant.

Figure 1 is a representation of average test scores by gender for the 2011-2012 through the 2014-2015 school years. Girls and boys had higher average test scores for the 2011-2012 through the 2013-2014 school years; however, the average scores of both groups were the lowest in the 2014-2015 school year. Girls outscored boys in all school years analyzed. The greatest average difference was 0.78 points and the smallest average difference was 0.14 points. For the 2011-2012 through the 2014-2015 school years, differences in the STAAR Mathematics scores of Grade 5 Asian, Black, Hispanic, and White students were analyzed. Of the 4 years investigated, results from all years were statistically significant. Figure 3 is a representation of the average test scores by ethnicity/race for the 2011-2012 through the 2014-2015 school years. The average scores of each student group increased slightly each year between the 2011-2012 and the 2013-2014 school years, with the exception of Black students, who had a very slight decrease (i.e., 0.04 points) in their average score in the 2012-2013 school year. However, the average scores of all student groups decreased to the lowest average score during the last school year. In each school year, Asian students earned the highest average score, followed by White, Hispanic, and Black students, respectively. In each year of the study, a stair-step achievement gap was clearly present (Carpenter et al., 2006). The largest average score difference for each school year was between Asian and Black students, which included a minimum average difference of 11.18 and a maximum average difference of 13.61. In each year, Asian students had the highest average score, followed by White, Hispanic, and Black students, respectively. A stair-step achievement gap was clearly evident in each school year (Carpenter et al., 2006). The largest average score difference was between Asian and Black students, which included a minimum difference of 6.80 points and a maximum difference of 8.20 points. The average test score difference increased between the first and last school year of data analyzed herein.

13 Discussion

In this multiyear statewide analysis, the STAAR Mathematics and Science test scores of Grade 5 students were obtained and analyzed. The degree to which differences were present in the STAAR Mathematics and Science test scores for Grade 5 students by their gender and by their ethnicity/race (i.e., Asian, Black, Hispanic, and White) were determined. Through analyzing four school years of Texas statewide data, any trends that might be present by student gender or by student ethnicity/race were identified.

Regarding Grade 5 STAAR Mathematics and Science exams by gender, all results were statistically significant, albeit with trivial effect sizes. The average Grade 5 Mathematics test scores of girls were consistently higher than for boys by under 1 point in all four school years. In contrast to the mathematics results, the average Grade 5 STAAR Science test scores of boys were consistently higher than for girls in all four school years, by less than 1 point difference each year.

With respect to the Grade 5 STAAR Mathematics test by student ethnicity/race, statistically significant differences were yielded for all four school years. Effect sizes were moderate for all analyses.

Achievement gaps were documented among the four ethnic/racial groups on this exam. In each school year, Asian students had the highest average test score, followed by White, Hispanic, and Black students, respectively.

Thus, a stair-step achievement gap (Carpenter et al., 2006) was clearly evident. The largest gap was between Asian and Black students with average score difference of between 11.18 and 13.61. Asian students had average scores that ranged from 39.97 to 41.02; White students had average scores that ranged from 34.06 to 36.40; Hispanic students had average scores that ranged from 29.63 to 32.70, and Black students had average scores that ranged from 26.37 to 29.85.

Regarding the Grade 5 STAAR Science exams for the 2011-2012 through the 2014-2015 school years, a stair-step achievement gap (Carpenter et al., 2006) was also clearly evident, although the gap was not as wide as in the Grade 5 STAAR Mathematics exam. Moderate effect sizes were present for all four school years. Asian students consistently had the highest average test scores, followed by White, Hispanic, and Black students, respectively. The largest gap was between Asian and Black students with average score differences ranging from 6.80 points to 8.20. For each Gaughan & Bozeman, 2015; PCAST, 2010) have noted the underrepresentation of women in STEM fields of employment; however, only minimal achievement gaps were documented herein between the average test scores of boys and girls on the Grade 5 STAAR Mathematics and Science exams for all four school years. The average scores of girls were slightly higher than the average scores of boys each year on the STAAR Mathematics exam; however, average score differences all four years were under 1 point. Regarding the Grade 5 Science exams, the average test scores of boys were slightly higher than the average scores of girls, with also an average difference of under 1 point for all years.

As a result of this study, the existing research regarding achievement gaps among Black and Hispanic students (Chatterji, 2006;Christian, 2008; Diaz-Rubio, 2013; NCES, 2016; PCAST, 2010) is reinforced. The average scores of Black and Hispanic students were consistently lower than Asian and White students on both the STAAR Mathematics Scores and the STAAR Science Scores for Grade 5 students for all four school years. Asian students had the highest average test scores, followed by White, Hispanic, and Black students, respectively.

14 b) Implications for Policy and Practice

In this multiyear analysis of Grade 5 STAAR Mathematics and Grade 5 STAAR Science test scores, Black and Hispanic students consistently scored lower on all tests. Although large differences were not present in the average test scores between boys and girls on the Grade 5 STAAR Mathematics and Science exams, it is a concern that women are not more represented in STEM employment fields. Educational policymakers could ensure that STEM-related programs are available that give these underrepresented groups (i.e., girls, Black, and Hispanic students) multiple opportunities to learn and practice mathematics and science inside and outside of school. Additionally, how students are assessed in mathematics and science could be reevaluated, with consideration given to authentic assessments that measure skills that standardized tests cannot measure such as creativity, problem-solving, and collaboration.

15 c) Recommendations for Educational Leaders

Policymakers are encouraged to write and fund a state STEM curriculum that is comprised of project-based lessons with many opportunities for students to solve real-world problems using technology. School and district leaders are encouraged to advocate for authentic STEM learning for all students. Teachers are encouraged to build relationships with students while teaching them STEM subjects, particularly with groups of students who have shown a lower interest in STEM careers (i.e., girls, Black and Hispanic students). School leaders should ensure that girls, Black, and Hispanic students are enrolled in advanced mathematics and science courses with Asian and White students. All students must have opportunities to think critically and to solve problems, teachers are encouraged to develop lesson ensure this higher level of learning. Furthermore, school and district curriculum leaders, and state leaders, in conjunction with teachers are encouraged to find and/or develop alternative assessments to measure those skills related to thinking and real world or authentic problem solving.

16 d) Recommendations for Future Research

Researchers are encouraged to replicate this investigation each school year to determine the degree to which the achievement gaps documented herein continue to be present. Furthermore, researchers may want to continue examining differences in test scores regarding gender and ethnicity to determine if achievement gaps continue among certain minority students (e.g., Black and Hispanic).

Additionally, because only Grade 5 Mathematics and Science STAAR Scores data were analyzed in this investigation, researchers are encouraged to extend this study to other grade levels, both early elementary grade levels as well as secondary grade levels.

Another recommendation for future research is to extend this study to other states with different assessments than are present in Texas.

Such research may provide information regarding the degree to which results from this study are generalizable to students in other states. A final recommendation would be for researchers to analyze the mathematics and science performance of students who are economically disadvantaged and English Language Learners, primarily because the percentage of these two groups of students with respect to student enrollment is rapidly increasing.

17 VII.

18 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 students, based on gender and ethnicity/race. Data were analyzed for four school years of data (i.e., ??011-2012, 2012-2013, 2013-2014, and 2014-2015). Statistically significant differences were present for all four school years. On the STAAR Mathematics exam, girls outscored boys all years by under 1 point each year. On the STAAR Science exams, boys outscored [1] [2]

1

2013-2014, and 2014-2015 School Years

School Year and Gender	n	M	SD
2011-2012			
Girls	183,132	32.96	10.30
Boys	190,972	32.47	10.67
2012-2013			
Girls	182,377	33.05	10.76
Boys	190,533	32.90	11.09
2013-2014			
Girls	185,941	34.01	10.42
Boys	193,474	33.64	10.82
2014-2015			
Girls	186,917	31.40	10.59
Boys	194,531	30.61	11.22

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 gender, $t(372835.19) = 4.02$, $p < .001$.

Figure 1: Table 1 :

2

2013-2014, and 2014-2015 School Years			
School Year and Gender	n	M	SD
2011-2012			
Girls	183,086	31.42	7.55
Boys	190,842	32.34	7.66
2012-2013			
Girls	182,286	29.33	7.83
Boys	190,414	30.31	7.95
2013-2014			
Girls	185,891	29.42	7.95
Boys	193,380	30.27	8.09
2014-2015			
Girls	190,112	29.09	8.28
Boys	199,217	29.57	8.53

Figure 2: Table 2 :

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2012-2013, 2013-2014, and 2014-2015 School Years			
School Year and Ethnicity/Race	n	M	SD
2011-2012			
Asian	13,615	40.20	9.88
White	113,439	35.40	10.29
Hispanic	191,992	31.49	10.08
Black	46,839	28.78	10.17
2012-2013			
Asian	13,615	40.20	9.88
White	113,439	35.40	10.29
Hispanic	191,992	31.49	10.08
Black	46,839	28.78	10.17
2013-2014			
Asian	14,773	41.02	9.96
White	111,597	36.40	10.15
Hispanic	197,206	32.70	10.34
Black	46,720	29.85	10.63
2014-2015			
Asian	15,457	39.97	9.13
White	109,757	34.06	10.44
Hispanic	199,956	29.63	10.52
Black	46,785	26.37	10.64

Figure 3: Table 3 :

4

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2013, 2013-2014, and 2014-2015 School Years

School Year and Ethnicity/Race	n	M	SD
2011-2012			
Asian	13,601	35.98	7.19
White	113,346	34.55	6.97
Hispanic	191,968	30.62	7.44
Black	46,800	29.18	7.67
2012-2013			
Asian	13,806	34.13	7.77
White	111,553	32.77	7.32
Hispanic	192,180	28.48	7.64
Black	46,551	26.81	7.69
2013-2014			
Asian	14,751	34.73	7.34
White	111,515	32.76	7.22
Hispanic	197,135	28.52	7.88
Black	46,724	26.72	7.92
2014-2015			
Asian	15,860	34.27	7.63
White	111,850	32.43	7.72
Hispanic	203,710	27.94	8.17
Black	48,167	26.07	8.28

Figure 4: Table 4 :

a) Connections to Existing Literature
Researchers (e.g., Beasley & Fischer, 2012;

Figure 5:

girls all years by under 1 point each year. Marked achievement gaps were present on the STAAR Mathematics and Science exams concerning ethnicity/race. All four years of the study, a stair-step achievement gap (Carpenter et al., 2006) was clearly evident. Each year, Asian students had the highest average scores, followed by White, Hispanic, and Black students, respectively. As such, results from this multiyear, statewide investigation are supportive that achievement gaps continue to exist among ethnic/racial groups and between boys and girls.

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