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Differences in Academic Performance by Grade Span Configuration for Students in Poverty

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I. Introduction

Differences in Academic Performance by Grade Span Configuration for Students in Poverty Student academic achievement, from toddlers through college-bound students, differs by income and poverty status (Coley & Baker, 2013). Coley and Baker (2013) utilized data from the Early Childhood Longitudinal Study Birth Cohort from 2009, and described the relationship between cognitive skills and poverty. In the area of Listening Comprehension, 39% of the 2-year olds who were at or above the poverty line scored proficient, whereas only 29% of the 2-year olds in poverty scored proficient. The 2-year olds scored similarly for the Expressive Vocabulary assessment: 67% who were at or above the poverty line scored proficient, whereas only 55% of the 2-year olds in poverty scored proficient. A similar relationship existed between poverty and achievement patterns for 4-year olds. In the area of Letter Recognition, 37% of the children at or above poverty scored in the proficient range, whereas only 20% of the 4-year olds in poverty scored proficient. A difference was present in the area of Numbers and Shapes. The 4-year olds at or above the poverty range scored 72% proficient, whereas less than one half, 45%, of the 4-year olds in poverty were proficient.

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Poor academic performance by children in poverty continues into the elementary, middle, and high school years. Coley and Baker (2013) reported on the progress measure in reading for students in Grades 4 and 8 who took the National Assessment of Educational Progress. Students in Grade 4 who were eligible for free lunch under the national lunch program had an average scale score of 206, whereas students who were not eligible for free lunch had an average scale sore of 235. The difference in average scale scores for the students in Grade 8 were similar to Grade 4. Students in Grade 8 who were eligible for free lunch had an average scale score of 250, whereas students who were not eligible had an average scale score of 275. Additionally, Coley and Baker (2013) compiled statistics from the College Board (2012) for SAT reading scores and family income from college bound seniors. Seniors who took the SAT and were from the lowest levels of family income (i.e., less than $20,000/year) scored over 100 points lower than those students from the highest levels of income (i.e., greater than $200,000/year). The relationship between the SAT Critical Reading score and family income had a strong relationship.

Reardon (2013) explained that family income, not ethnicity/race, is more suggestive of educational success in the United States today. As such, this relationship represents a change from the 1950s and 1960s. DeNavas-Walt, Proctor, and Smith (2013) determined that the real median household income in 2012 ($51,017) was 8.0% lower than in 2007 ($55,627) and 9.0% lower than the median household in 1999 ($56,090). The official poverty rate in 2013 was 14.5% or 45.3 million people living in poverty (DeNavas-Walt et al., 2013).Children represented 23.5% of the total population and 32.3% of the people in poverty (about one in five children ages six and under were in poverty in 2013). Finally, more than one-half (55%) of the children ages six and under were in poverty if they were being raised by a female head of house. This statistic was five times more (i.e., 10.2%) than if children ages six and under were being raised by married couples (De Navas-Walt et al., 2013).Abramsky (2013) stated that with the exception of Romania, the United States had the highest

percentage of children living in poverty than any developed country. Of importance for this investigation is that poverty influences the educational opportunities available to children and the educational outcomes they are likely to achieve (Coley & Baker, 2013).

The economic means of a family have a profound effect on the success of a student in school. Burney and Beilke (2008) noted, "to gain the rigorous academic preparation needed for success, a student must have the opportunity and background preparation to do well, which is often absent in low-income households" (p. 302). Clotfelter, Ladd, and Vigdor (2011) documented the lack of opportunities and background preparation that families in poverty have to face including poor health, limited access to quality preschools, limited summer and after school programs, more movement in and out of schools, and teachers with lower credentials. These examples are all issues with which families in poverty struggle to support their children's education.

Abbott and Joireman (2001), in an analysis of school achievement by ethnicity/race and income levels, documented that income levels have a greater effect on academic achievement than ethnicity/race. Students from high poverty family environments typically have (a) less exposure to parents who model reading, (b) fewer books in their home, (c) few interactions with technology, and (d) differing patterns of interactive reading and conversation within the family unit than students with families of higher education levels (Chatterji, 2006). Moreover, students in poverty may not have the financial means to participate in school-related activities directly correlated to higher achievement (Eccles, Barber, Stone, & Hunt, 2003).

The National Center for Education Statistics gathered data on economic disadvantage and academic achievement. In 2011 Grade 4 and Grade 8 students who were economically disadvantaged had lower reading and mathematics scores than students who were not economically disadvantaged. The mean difference for the scale score in Grade 4 mathematics between the two groups was 23 percentage points, and the mean difference for Grade 4 reading between the two groups was 27 percentage points. Similarly, the mean difference between the Grade 8 scores of students who were economically disadvantaged and students who were not economically disadvantaged in mathematics was 26 percentage points and 24 percentage points in the area of reading. Presented in the 2009 Comprehensive Annual Report for the Texas Education Agency Grade 10 students who were economically disadvantaged passed the Texas Assessment of Knowledge and Skills (TAKS) Mathematics assessment and the Algebra I assessment at a rate of 44% which was 17% points lower than those students who were not economically disadvantaged who scored 61%. Students who were economically disadvantaged scored 21 percentage points lower (51%) than those students who were not economically disadvantaged (72%) in Geometry (Texas Education Agency, 2010).

Numerous authors (e.g., Abbott &Joireman, 2001; Burney & Beilke, 2008; Chatterji, 2006) have documented that students in poverty come to school with deficits that affect their academic achievement. In addition to deficits, students and families in poverty are subject to inaccurate stereotypes; ones that Gorski (2012) rebutted with facts and figures. For example, the stereotype that poor people are lazy was invalidated with the fact that many poor people work over 2,500 hours per year-equivalent to 1.2 full time jobs. These positions require the most intense manual labor and have virtually no benefits (Gorski, 2012). The idea that poor people do not value education was expounded upon with the concept that class specific barriers that inhibit school involvement included the ability to afford to take off from wage work, the ability to afford child care, and the ability to afford public transportation (Gorski, 2012). "Stereotypes can misdirect efforts to implement effective policies for eliminating socioeconomic in equities in schools" (Gorski, 2012, p. 313).

Under the mandates of the No Child Left Behind Act (2002), educators are held responsible for the academic success of all students. As such, the academic achievement of students who are economically disadvantaged, as well as the academic achievement of students who are not economically disadvantaged, is salient for educational leaders. One school characteristic, relevant to this article and to student achievement, is grade span configuration of schools. Renchler (2002) contended that grade span configuration may have a tremendous influence on student success; however, only a few research studies have been conducted in this area.

In one such investigation, Wren (2003) compared the academic achievement of Grade 6, 7, and 8 students in middle schools and K-8 public schools and determined that students had higher academic achievement test scores in the K-8 setting than in the middle school settings. Clark (2012) established that students who were enrolled in K-8 schools had a higher passing rate on state assessments than students enrolled in middle schools. In her study of the most effective grade span configuration for Grade 5 students in meeting the benchmark standards of the No Child Left Behind Act, Comer (2006) determined that the elementary school configuration had the highest percentage of students meeting the academic standards. Of interest is that the grade span configuration that had the least educational benefit was the K-12 grade span schools. With reference to Texas, the state of interest in this investigation, Clark et al. (2013) analyzed the extent to which differences were present in reading and mathematics performance on

state assessments of students in K-8 schools versus middle schools for five school years. For all five years, students who were enrolled in a K-8 grade span configuration had higher passing rates in reading and mathematics than their counterparts who were enrolled in a 6-8 grade span configuration. As the number of grade levels increase in a school setting (i.e., a greater span of grades within a school setting), the academic achievement of students increases simultaneously (Wren, 2003).

Rock off and Lockwood (2010), in an analysis of data on students who transitioned from an elementary school to a middle school, documented the presence of a 0.15 standard deviation decrease in reading and mathematics performance after the transition occurred. They contended that when students are combined from additional elementary settings into one large cohort in the middle school many issues can arise. Middle school students can be difficult to educate due to low self-esteem, increasing negativity, and an increased inability to judge risks and consequences of their actions (Rock off & Lockwood, 2010).

In a recent investigation about grade span configuration and academic achievement of middle level students, Meyer (2014) analyzed the academic achievement of Grade 5 students in Texas on the statewide assessments in reading, mathematics, and science during the 2006-2011 school years. After analyzing every possible grade span configuration, Meyer (2014) documented that Grade 5 students in a K-5 or K-6 grade span configuration outperformed Grade 5 students in any other grade span settings. The lowest academic performance was obtained by students who were enrolled in an EE-12 grade setting. In an additional layer of the study, Meyer (2014) reviewed the effects of economic status on the academic achievement of fifth graders. Grade 5 students who were not economically disadvantaged had a higher passing rate for every subject area on the statewide examinations. Students receiving reduced prices in lunch had the next highest passing rates, and the lowest passing rates came from the students receiving free lunch. In every case the difference between the highest passing rates and lowest passing rates was a difference of 20% points or more (Meyer, 2014).

An even more recent study completed on Texas Grade 5 and 6 students in poverty was conducted by Fiaschetti and Slate (2015). They analyzed the academic achievement of Grade 5 and Grade 6 students on the Texas statewide assessment, in the areas of reading and mathematics. Students were grouped according to the grade span configuration of their school, either PreK-5/6 or single/double grade level configurations (i.e., Grades 4-5, 5 only, or 5-6). Statistically significant differences were present in the reading scores of students who were economically disadvantaged in the multilevel grade span versus the single/double grade span configuration. Reading scores for students in Grades 5 and 6 were almost 2% higher in the multilevel schools than in the single or double grade level schools.

With in the last 15 years, researchers (e.g., Dove, 2007; Howley, 2002; Weiss & Kipnes, 2006) have completed studies in which they concluded transitions and grade span configurations were not the primary reasons for student success in school. Dove (2007) examined the mathematics and literacy achievement of three different groups of students in Grade 6 dependent upon their transitions (i.e., grade span) over a 3-year time period. Dove (2007) noted that grade span configuration alone did not account for negative achievement scores in the middle grades on the Arkansas Benchmark Examination. Huss (2004) completed a descriptive study about the perceptions on middle schools including their organization, grade span, teacher licensure, and curriculum studies, based on the responses of middle level teachers in elementary, middle, and junior high settings. Huss (2004) determined that no matter what grade span configuration, teachers who teach middle grades have attempted to meet the specific needs of adolescent students in terms of the middle school philosophy including a "shared vision, educators committed to young adults, positive school climate, and an adult advocate for every child, family and community partnerships, high expectations for all students, buttressed by an integrative, exploratory curriculum" (p. 1).

In research studies on grade span configuration, including investigations involving students who were economically disadvantaged, no conclusive evidence exists that grade span configuration is the key to academic achievement. Researchers must continue to analyze this topic and add to the body of research on the effects of grade span configuration on the academic achievement of students in poverty. It is imperative that researchers continue to support this population in providing every opportunity available for them to achieve academic success.

a) Statement of the Problem

Former Secretary of Education, Margaret Spellings, stated that "No Child Left Behind is about a commitment to all children, and of course, it's one that we absolutely must honor if we're going to continue to thrive as the great nation that we are" (USDE, 2005, p. 1). The objectives of the No Child Left Behind Act are focused on increased accountability and academic achievement for all students. The importance of academic success for all student groups in all settings is getting national recognition (Reyes, 2008). The No Child Left Behind Act has been a stimulus in intervening with students who are not making progress (individually and across subgroups) and has improved

teaching and learning (Jorgenson, 2012). School district leaders have investigated many methods to improve teaching and learning that have included curriculum changes, implementation of various intervention programs, and variations in class size. Another method district leaders can take to support student success for individuals and across subgroups is the grade span configuration of local school settings (Combs et al., 2011; Fiaschetti & Slate, 2015). The concept of grade span configuration has been extensively reviewed by educators and researchers in regard to the most appropriate social, emotional, and academically sound placement for students in the middle grades, particularly students in Grades 5 and 6 (Clark et al., 2013; Combs et al., 2011; Dove, 2007; Fiaschetti & Slate, 2015; Johnson, Jones, Simieou, Matthew, & Morgan, 2012; Meyer, 2014; Renchler, 2002; Rock off & Lockwood, 2010; Wren, 2003).

The concept that has not been addressed in depth in the research literature is the effect of grade span configuration on the academic achievement of students in poverty. Particularly not well examined in the extant literature is a comparison of the academic performance of students who are economically disadvantaged as a function of grade span configurations of single or double grade levels in comparison to the typical elementary school setting (K-5). As early as the late 1990s, researchers (Cunningham & Stanovich, 1997) confirmed that reading ability in the first grade was a strong predictor of reading success in the eleventh grade, even when measures of cognitive ability were ruled out. The importance of elementary curriculum, the efficacy of instruction, and the consistency of relationships are paramount in the future success of all students, particularly students of economic disadvantage. School boards are making decisions about the makeup of their schools and grade levels therein to meet the demands and rigor of the No Child Left Behind Act expectations without sufficient research. The number of transitions students make in moving from one school to another may influence, negatively, student academic performance. As such, the academic performance of students in a single or double grade level school may be lower than the academic performance of students who remain in a K-5 setting. Additionally, this research investigation will be in an area of need at the state level due to the fact that most decisions regarding school policies and procedures are made at the state and local level (Howley, 2002).

b) Purpose of the Study

Given the emphasis on all students being academically successful, efforts are needed to support the academic achievement of students who are economically disadvantaged. The purpose of this study was to examine the relationship of two specific grade span configurations to the reading and mathematics achievement of students in poverty for the 2012-2013 through the 2014-2015 school years. Specifically, the academic achievement of students in Grade 5 and 6 for students in poverty were examined separately with respect to the grade span configuration of the school in which they were enrolled. As such, the extent to which grade span configuration was related to academic achievement was determined separately for students in a PreK-6 grade campus and for students in single or double grade campuses (Grades 4-5, 5 only, or Grades 5-6).

c) Significance of the Study

Wren (2003) commented that if grade span configuration does make a difference in the achievement of students, then school administrators should give serious consideration regarding the configurations of their schools. Renchler (2002) contended that grade span configuration may have a tremendous influence on student success, however, only limited research exists on this topic, specifically for students of poverty. Through this study valuable information was obtained on the relationship of grade span configuration with the academic achievement (i.e., reading and mathematics) of students in poverty within multi-grade level or single/double grade span configurations. The information gathered by this research will provide educational leaders and policymakers with credible data regarding the extent to which grade span configuration is related to student academic performance. Furthermore, the extent to which students in poverty have differences in their reading and mathematics achievement as a function of grade span configuration was determined. Accordingly, policymakers and educational leaders may utilize this information to determine how to configure their school settings to obtain the highest academic achievement for all students.

d) Research Questions

The following research questions were addressed in this study: (a) What is the difference in reading achievement as a function of grade span configuration for Grade 5 students in poverty?; (b) What is the difference in mathematics achievement as a function of grade span configuration for Grade 5 students in poverty?; (e) What is the difference in reading achievement as a function of grade span configuration for Grade 6 students in poverty?; (e) What is the difference in mathematics achievement as a function of grade span configuration for Grade 6 students in poverty? All four research questions were examined for three school years of data (i.e., 2012-2013, 2013-2014, and 2014-2015). Following the statistical analyses, the extent to which trends were present in reading and in mathematics achievement were determined for each grade span configuration.

II. Method

a) Research Design

The archival data that were utilized herein represent past events (Johnson & Christensen, 2012), therefore, a non-experimental causal-comparative research design (Creswell, 2009; Johnson & Christensen, 2012) was utilized for this study. In non-experimental, causal-comparative research, no manipulation of the independent variable occurs. Due to the design of the study, the independent variables had already occurred and extraneous variables were not controlled. The independent variable involved in this research article was grade span configuration (i.e., multi-grade level schools or single/double grade level schools). For each grade span configuration, the dependent variables were the State of Texas Assessments of Academic Readiness (STAAR) Reading and Mathematics passing rates. The samples of students whose data were analyzed were students who met the state criteria for being economically disadvantaged. Economic disadvantage exists when students are eligible for free or reduced-price meals under the National School Lunch and Child Nutrition Program. Additional economic disadvantage criteria include: (a) families with an annual income at or below the official federal poverty line; (b) families eligible for Temporary Assistance to Needy Families (TANF) or other public assistance; (c) families that have received a Pell Grant or other state program of need based on financial assistance; (d) families eligible for programs assisted under the Title of the Job Training Partnership Act (JTPA); or (e) families eligible for benefits under the Food Stamp Act of 1977 (Texas Education Agency, 2014).

b) Participants and Instrumentation

Archival data were obtained for the 2012-2013 through the 2014-2015 school years from the Texas Education Agency Ask Texas Education Directory (Texas Education Agency, 2016) and Texas Academic Performance Reports system for all Grade 5 and 6 students. Test scores for Grade 5 and 6 students in poverty and the grade span configuration in which students were enrolled were obtained from the Texas Academic Performance Reports and Ask Texas Education Directory. All school campuses and school districts are mandated by the Texas Education Agency to report student demographic characteristics, along with other salient information. Each spring students take the state-mandated assessments and the scores are provided to the Texas Education Agency.

Specific data downloaded from the Texas Education Agency Academic Performance Reports were: (a) grade span configuration of the school in which each student was enrolled; (b) student demographic characteristics; and (c) reading and mathematics achievement passing rates. Readers are referred to the Texas Education Agency website for more detailed information about the data they require school campuses and school districts to provide; for the auditing procedures used to ensure accuracy of the data; and for the technical manuals on the score reliabilities and score validities of the STAAR Reading and Mathematics tests.

III. Results

Prior to conducting inferential statistics to determine whether differences were present between single/double and multi-grade level schools in the academic achievement of students who were 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. For results that were statistically significant at the .05 level, the effect size (i.e., Cohen's *d*) was calculated. Statistical results will now be presented by academic subject area.

For the 2012-2013 school year for Grade 5 students, the parametric independent samples *t*-test revealed a statistically significant difference, $t(151.04) = 2.96$, $p = .004$, between single/double grade level schools and multi-grade level schools on the STAAR Reading test passing rates. This difference represented a small effect size (Cohen's *d*) of 0.37 (Cohen, 1988). Grade 5 students in poverty had higher STAAR Reading passing rates in multi-grade level schools by more than 5%than did their peers who were enrolled in single/double grade level schools. Readers are directed to Table 1 for the descriptive statistics for this analysis.

Table 1: Descriptive Statistics for the STAAR Reading Passing Rates by Grade Span Configuration for Grade 5 Students in Poverty for the 2012-2013 Through the 2014-2015 School Years

Grade Span Configuration	*n* of schools	*M*	*SD*
2012-2013			
Single/Double	239	82.01	8.34
Multi-Grade	105	85.79	11.85
2013-2014			
Single/Double	243	80.35	9.02
Multi-Grade	103	84.77	11.11
2014-2015			
Single/Double	241	81.64	9.71
Multi-Grade	394	84.31	11.86

Concerning the 2013-2014 school year for Grade 5 students, the parametric independent samples *t*-test yielded a statistically significant difference, $t(161.67) = 3.57$, $p < .001$, on the STAAR Reading test passing rates as a function of grade span configuration. This difference represented a small effect size (Cohen's *d*) of 0.44 (Cohen, 1988). Congruent with the previous year, Grade 5 students in poverty had higher STAAR Reading passing rates in multi-grade level schools by more than 3% than did their peers who were enrolled in single/double grade level schools. The descriptive statistics for this analysis are presented in Table 1.

With respect to the 2014-2015 school year for Grade 5 students, the parametric independent samples *t*-test revealed a statistically significant difference, $t(581.92) = -3.09$, $p = .002$, on the STAAR Reading test passing rates as a function of grade span configuration. This difference represented a small effect size (Cohen's *d*) of 0.25 (Cohen, 1988). Commensurate with the previous two years, Grade 5 students in poverty had higher STAAR Reading passing rates in multi-grade level schools by more than 2% than did their peers who were enrolled in single/double grade level schools. Delineated in Table 1 are the descriptive statistics for this analysis.

Next, the STAAR Mathematics test passing rates were analyzed as a function of grade span configuration for Grade 5 students in poverty. Concerning the 2012-2013 school year, the parametric independent samples *t*-test did not reveal a statistically significant difference, $t(160.74) = 1.43$, $p = .16$, on the STAAR Mathematics test passing rates as a function of grade span configuration. Passing rates on the STAAR Mathematics test were comparable for Grade 5 students in poverty in both grade span configuration groupings. Revealed in Table 2 are the descriptive statistics for this analysis.

Table 2: Descriptive Statistics for the STAAR Mathematics Passing Rates by Grade Span Configuration for Grade 5 Students in Poverty for the 2012-2013 Through the 2014-2015 School Years

Grade Span Configuration	*n* of schools	*M*	*SD*
2012-2013			
Single/Double	239	82.87	9.46
Multi-Grade	106	84.80	12.48
2013-2014			
Single/Double	243	83.18	9.86
Multi-Grade	101	85.78	12.75

Concerning the 2013-2014 school year for Grade 5 students, the parametric independent samples *t*-test did not reveal a statistically significant difference in STAAR Mathematics passing rates between the two grade span configurations, $t(152.00) = 1.83$, $p = .07$. Although the multi-grade level campuses had slightly higher passing rates on the STAAR Mathematics assessment by two percentage points, the results were not statistically significant at the conventional alpha level of .05. Readers are referred to Table 2 for the descriptive statistics for this analysis.

Results of the statistical analyses for Grade 6 students will now be reported. For the 2012-2013 school year, the parametric independent samples *t*-test revealed a statistically significant difference t (138.36) = 2.97, $p = .004$,between single/double grade level schools and multi-grade level grade schools on the STAAR Reading test passing rates. This difference represented a small effect size (Cohen's *d*) of 0.39 (Cohen, 1988). Grade 6 students in poverty had STAAR Reading passing rates in multi-grade level schools that were more than 5% higher than their peers who were enrolled in single/double grade level schools. Table 3 contains the descriptive statistics for this analysis.

Table 3: Descriptive Statistics for the STAAR Reading Passing Rates by Grade Span Configuration for Grade 6 Students in Poverty for the 2012-2013 Through the 2014-2015 School Years

Grade Span Configuration	*n* of schools	*M*	*SD*
2012-2013			
Single/Double	200	67.44	10.39
Multi-Grade	100	72.86	16.71
2013-2014			
Single/Double	208	75.54	9.77
Multi-Grade	102	78.86	14.38
2014-2015			
Single/Double	178	72.75	10.47
Multi-Grade	382	76.86	13.83

Concerning the 2013-2014 school year for Grade 6 students, the parametric independent samples *t*-test yielded a statistically significant difference, $t(148.21) = 2.11$, $p = .04$, on the STAAR Reading test passing rates as a function of grade span configuration. This difference represented a small effect size (Cohen's *d*) of 0.27 (Cohen, 1988). Congruent with the previous year, Grade 6 students in poverty had higher STAAR Reading passing rates in multi-grade level schools by more than 3% than did their peers who were enrolled in single/double grade level schools. The descriptive statistics for this analysis are presented in Table 3.

With respect to the 2014-2015 school year for Grade 6 students, the parametric independent samples *t*-test revealed a statistically significant difference, $t(445.06) = -3.89$, $p < .001$, on the STAAR Reading test passing rates as a function of grade span configuration. This difference represented a small effect size (Cohen's *d*) of 0.33 (Cohen, 1988). Commensurate with the previous two years, Grade 6 students in poverty had higher STAAR Reading passing rates in in multi-grade level schools by more than 4% than did their peers who were enrolled in single/double grade level schools. Revealed in Table 3 are the descriptive statistics for this analysis.

Next, the STAAR Mathematics test passing rates were analyzed as a function of grade span configuration for Grade 6 students in poverty. Concerning the 2012-2013 school year, the parametric independent samples *t*-test revealed a statistically significant difference, $t(149.81) = 2.83$, $p = .01$, on the STAAR Mathematics test passing rates between the two grade span configurations. The difference represented a small effect size (Cohen's *d)* of 0.36 (Cohen, 1988). Grade 6 students in poverty had higher STAAR Mathematics passing rates in multi-grade level schools by more than 5% than did their peers who were enrolled in single/double grade level schools. The descriptive statistics for this analysis are presented in Table 4.

Table 4: Descriptive Statistics for the STAAR Mathematics Passing Rates by Grade Span Configuration for Grade 6 Students in Poverty for the 2012-2013 and the 2013-2014 School Years

Grade Span Configuration	*n* of schools	*M*	*SD*
2012-2013			
Single/Double	200	70.60	11.40
Multi-Grade	102	75.83	16.79
2013-2014			
Single/Double	207	77.44	11.01
Multi-Grade	103	82.36	14.91

With respect to the 2013-2014 school year for Grade 6 students, the parametric independent samples *t*-test revealed a statistically significant difference, $t(159.05) = 2.97$, $p = .003$, on the STAAR Mathematics passing rates as a function of grade span configuration. This difference representeda small effect size (Cohen's *d*) of 0.38 (Cohen, 1988). Commensurate with the previous year, Grade 6 students in poverty had higher STAAR Mathematics passing rates in multi-grade level schools by more than 4% than did their peers who were enrolled in single/double grade level schools. Revealed in Table 4 are the descriptive statistics for this analysis.

IV. Discussion

In this investigation, the extent to which differences were present in reading and mathematics achievement as a function of grade span configuration for students in poverty in Texas was examined. Three years of Texas statewide data were obtained and analyzed on students in Grades 5 and 6 who wereenrolled in either multi-grade level schools (i.e., PreK-6) or in single/double grade level campuses (i.e., Grades 4-5, 5 only, or Grades 5-6). For all three school years analyzed, the passing rates on the STAAR Reading tests for Grade 5 and 6 students in poverty

were statistically significantly higher in multi-grade level schools than in single/double grade level schools. Passing rates on the STAAR Mathematics tests for Grades 5 and 6 students in poverty were statistically significantly higher in multi-grade level schools in one of the two school years than in single/double grade level schools.

To determine the magnitude of the differences between the average passing rates for students in poverty attending a single/double grade level configuration or a multi-grade level grade span configuration for each school year, a Cohen's *d* (Cohen, 1988) was calculated for each subject, school year, and grade level. The array of the Cohen's *d* calculations for both the STAAR Reading and Mathematics analyses was from a low of 0.17 to a high of 0.44, with the range being 0.27 for the three years of data analyzed. Thus, the average degree of practical significance of the statistically significant results was small. Delineated in Table 5 are the Cohen's *d* effect size calculations for the STAAR Reading and Mathematics analyses.

Table 5: Cohen's d for Differences in the STAAR Reading and Mathematics Passing Rates by Grade Span Configuration for Grade 5 and 6 Students in Poverty for the 2012-2013 Through the 2014-2015 School Years

Grade and Subject	2012-2013	2013-2014	2014-2015
Grade 5			
STAAR Reading	0.37	0.44	0.25
STAAR Mathematics	N/A	0.23	N/A
Grade 6			
STAAR Reading	0.39	0.27	0.33
STAAR Mathematics	0.36	0.38	N/A

With reference to the STAAR Reading results of Grade 5 students in poverty, Cohen's *d* values ranged from a low of 0.25 to a high of 0.44 for the three years that were analyzed. In comparison, the Cohen's *d* was calculated for the STAAR Reading results of Grade 6 students in poverty which ranged from a low of 0.27 to a high of 0.39 for the same three years that were analyzed. For both grade levels, students enrolled in multi-grade level schools performed at a higher rate on the STAAR Reading assessment than did their peers in single/double grade level schools. Students enrolled in multi-grade level schools had an average passing rate that was 2.67% to 5.42% higher than the average passing rate for students enrolled in single/double grade level schools. Readers are referred to Table 5 for these Cohen's *d* calculations.

In regard to the STAAR Mathematics test performance for Grade 5 students in poverty, a Cohen's *d* was calculated to determine the magnitude of difference. Only two years of data were reported for the STAAR Mathematics due to the fact that performance standards were not yet established for the redesigned assessment which included the new curriculum standards (Texas Education Agency, 2013). The Cohen's *d* difference in STAAR Mathematics passing rates as a function of grade span configuration for Grade 5 students in poverty was from 0.17 to 0.23. The difference of these averages for the two years were 1.93% and 2.6%, respectively. Both of these averages were in favor of students attending multi-grade level schools in comparison to students attending single/double grade level schools. Table 5 contains these Cohen's *d* calculations.

Concerning the STAAR Mathematics Assessment for Grade 6 students in poverty, the Cohen's *d* difference in STAAR Mathematics passing rates by grade span configuration for Grade 6 students in poverty ranged from 0.36 to 0.38. The difference in the average passing rates were 5.23% and 4.92%, with both differences being in favor of students attending multi-grade level schools in comparison to students attending single/double grade level schools. Readers are referred to Table 5 for these Cohen's *d* calculations. Grade 5 and Grade 6 students in poverty who were enrolled in multi-grade level schools had higher average passing rates in reading and in mathematics for the 2012-2013, 2013-2014, and 2014-2015 school years than their peers who were enrolled in single/double grade level schools. Readers are referred to Table 6 for the mean differences in passing rates between the grade span configurations and the grade span configuration in which students in poverty had the highest average passing rates.

Table 6: Differences in the STAAR Reading and Mathematics Passing Rates by Grade Span Configuration for Grade 5 and 6 Students in Poverty for the 2012-2013 Through the 2014-2015 School Years

Grade, Subject, and Year	Mean Difference	Grade Span With Highest Passing Rate
Grade 5		
STAAR Reading		
2012-2013	3.78	Multi-Grade Level
2013-2014	4.42	Multi-Grade Level
2014-2015	2.67	Multi-Grade Level
STAAR Mathematics		
2012-2013	1.93	Multi-Grade Level
2013-2014	2.60	Multi-Grade Level
Grade 6		
STAAR Reading		
2012-2013	5.42	Multi-Grade Level
2013-2014	3.32	Multi-Grade Level
2014-2015	4.11	Multi-Grade Level
STAAR Mathematics		
2012-2013	5.23	Multi-Grade Level
2013-2014	4.92	Multi-Grade Level

a) Connections with Existing Literature

Researchers (e.g., Clark, 2012; Clark et al., 2013; Combs et al., 2011; Fiaschetti& Slate, 2015; Johnson et al., 2012) have examined the relationship of academic achievement with grade span configuration. In this multiyear, statewide investigation, results were congruent with Johnson et al. (2012) wherein students who were enrolled in schools with multi-grade level grade span configurations had higher academic achievement scores than did their peers in schools with single/double grade span configurations. Similarly, results delineated herein were commensurate with Clark (2012) who contended that an optimal grade span configuration for students to be academically successful would have multiple grade levels, specifically K-8, in comparison to a middle school (6-8) grade span configuration.

Readers should recognize, however, that other researchers (e.g., Carolan & Chesky, 2012; Wilson & Slate, 2014) have produced results that are not commensurate with the results of this multiyear, statewide investigation. Carolan and Chesky (2012) and Wilson and Slate (2014) both determined that grade span configuration was not related to the academic achievement of all students in the middle school setting. Carolan and Chesky (2012) analyzed the influence of school attachment on the relationship between grade span configuration and student achievement in reading and mathematics. They contended that getting young adolescents to enjoy school, develop positive adult and peer relationships, and feeling safe were all school attachment factors that played a greater role in increasing student achievement than grade span configuration. Wilson and Slate (2014) investigated grade span configuration and its relationship on student achievement for Grade 6 Hispanic and Black students. They documented that Hispanic students had statistically significantly higher scores in a traditional 6-8 grade school setting versus a multi-grade level, K-8, school setting. Black students in Grade 6 performed in a similar manner on achievement assessments in the 6-8 and K-8 school settings.

b) Connection to Theoretical Framework

In this research article, the school connectedness theory (Klem& Connell, 2004; McCormick & O'Conner, 2015; Rimm-Kaufman, Baroody, Larsen, Curby, & Abry, 2015) was utilized as the theoretical framework. As mentioned previously, academic achievement is not only related to grade span configuration but also to school connectedness. The theory of school connectedness encompasses the concept that positive relationships with their teachers and staff members who care about them, will result in a positive attitude, student satisfaction, and higher academic engagement (Klem& Connell, 2004). Results from this particular study are supportive of schools with

a multi-grade level span having more student connectedness than single/double grade level schools. Conclusively, students who are able to develop close, positive relationships with the school staff for a greater period of time have higher academic performance.

c) Implications for Policy and Practice

In this analysis of academic achievement and grade span configuration for Grade 5 and 6 students in poverty, students in schools with multi-grade level configurations had the highest passing rates on the STAAR Reading and Mathematics assessments. Grade span configuration has substantial implications for education policy and practice. First, educational leaders need to examine the current grade span configurations of their schools. If schools within their district that have single or double grade levels are not performing well with regard to their schools that have multi-grade level grade spans, then the possibility of reconfiguration would merit consideration. Another idea would be for educational leaders to develop communities or families within their schools to create an atmosphere that would enable students to develop closer relationships with staff members. With respect to students in poverty, the United States has the highest percentage of people living in poverty, with nearly 25% of the population consisting of children (Abramsky, 2013). It is critical that school leaders identify factors that support the academic achievement of students in poverty. Educational leaders need to find ways to increase the academic engagement and performance of students in poverty and assist in supporting positive, and caring relationships with staff members that allow students to be connected to their school community. For future school construction, Texas legislators should examine the extant literature on grade span configuration and student performance.

d) Recommendations for Future Research

For this study, differences in academic achievement as a function of grade span configuration were examined for students in poverty. Given the consistent results that were obtained, researchers should consider extending this study to other groups of students such as at-risk or English Language Learners to determine whether grade span configuration is related to their academic achievement. Because the grade span configuration and academic achievement data analyzed in this study were aggregated data across Texas elementary and middle schools, researchers are encouraged to examine individual student level data from the Texas Education Agency Public Education Information Management System. Individual student level analyses would provide more detailed results than aggregated school level data. Such individual level analyses could be conducted by ethnicity/race, by student programmatic enrollment, and by school campus level. Furthermore, this study could also be extended to other states. Additionally, an investigation could be conducted analyzing grade span configuration and additional school connectedness variables such as attendance rates, truancy, and misbehaviors.

For purposes of this study, quantitative data were used; therefore, researchers are encouraged to examine qualitative data including perceptions of educational leaders, teachers, and students regarding grade span configuration and its relation to academic achievement. Moreover, the underlying mechanisms by which grade span configuration is related to academic achievement have yet to be determined. As such, researchers are encouraged to conduct studies into the underlying reasons for the relationship between grade span configuration and academic achievement. Finally, a mixed method research study would be beneficial to identify school personnel and student views on school connectedness as it relates to grade span configuration and how their perceptions match the academic achievement data at their schools.

V. Conclusion

The purpose of this research study was to determine the degree to which differences were present in reading and mathematics achievement as a function of grade span configuration for students in poverty in Texas. Data were analyzed for all Grade 5 and 6 students in poverty who were enrolled in multi-grade level schools (PK-6) and in single/double grade level schools (Grades 4-5, 5 only, or Grades 5-6)in Texas for the 2012-2013 through the 2014-2015 school years. Statistically significant differences were present in passing rates for Grade 5 students in poverty for reading and Grade 6 students in poverty for reading for all three years analyzed, and statistically significant differences were present for two years for mathematics passing rates for Grade 6 students in poverty. Grade 5 and Grade 6 students in poverty had higher average passing rates for all subject areas for all three years analyzed in a multi-grade level configuration setting than in a single/double grade level setting. Congruent with previous researchers (e.g., Clark, 2012; Johnson et al., 2012), students in poverty who were enrolled in multi-grade level schools had higher levels of academic achievement than did their peers who were enrolled in a single/double level grade setting.

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