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Reading Achievement of Middle School Boys in Single-Gender and Coeducational School

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This is to certify that the doctoral study by

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Walden University
2018

Abstract

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Jean Hunter-Batty

MS, Western Illinois University, 1979

BS, Western Illinois University, 1978

Project Study Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Education

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Abstract

The problem addressed in the study was the lack of evidence on the efficacy of the single-gender educational model as compared to the coeducational model in increasing reading achievement for middle school boys in the local school district. Leaders in the district implemented the single-gender model to address the problem of an ongoing reading achievement gap among middle school boys and girls. The gap has also been noted nationally and leads to limited reading-dependent opportunities for boys. The purpose of this quantitative study was to compare the two educational models to determine whether the single-gender model offered advantages over the coeducational model as measured by standardized reading test scores. The study was grounded in Gardner's theory of multiple intelligences and Jensen's brain-based learning theory. A causal-comparative design was used to compare the two models. Archival data for 386 boys who were enrolled, but not necessarily continuously, in Grade 6 in 2011-2012, Grade 7 in 2012-2013, and Grade 8 in 2013-2014 were analyzed. The independent variable was school type (either single-gender or coeducational), and the dependent variable was standardized reading test scores. The one-way ANOVA and Kruskal-Wallis H tests indicated no statistically significant differences in reading test scores between school types. Based on the findings, a continuous improvement model was proposed in a white paper as an alternative solution to address reading achievement among middle school boys. This project has the potential to elicit positive social change for middle school students by revitalizing instruction and assessment strategies in both single-gender and coeducational schools to maximize reading achievement and learning outcomes.

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Dedication

This study is dedicated to my husband, Gerald Clyde Batty, for his love, encouragement, and support through this endeavor. In addition to my husband, I dedicate this study to my mom and dad, Thelma Hunter-Powers and Isaac Murphy Hunter, Sr., my first teachers and my greatest inspiration. I also dedicate this study to my family and friends. Persistence, the pursuit of knowledge, and belief in yourself will take you to all the places you want to go.

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Section 1: The Problem

To participate fully in society, individuals require efficacy in reading. Yet, according to a 2013 study of adult illiteracy in the United States, 14% of adults or, 32 million individuals are either illiterate or can only perform simple literacy tasks (Organisation for Economic Co-operation and Development [OECD], 2013). Functional literacy is the foundation for a student's academic and, potentially, professional success, researchers have found (OECD, 2014). Without reading skills, one lacks access to vital information regarding safety, nutrition, health, general well-being, and information that expands and enriches understanding of culture, history, literature, science, mathematics, among other topics (Robinson & Lubienski, 2011). A student's inability to read and write also has repercussions for future opportunities that demand proficient literacy (Legewie & DiPrete, 2012). As has been noted, many American adults possess limited reading skills which makes it difficult to function in society and have fewer opportunities in every area of life.

A challenge for many schools in the United States, thus, is improving students' reading skills. In spite of the existence of strategies to help struggling adolescent readers, reading scores have failed to improve for U.S. middle and high school students (McKenna, Conradi, Lawrence, Jang, & Meyer, 2012). The results of the 2013 National Assessment of Educational Progress (NAEP) showed 22% of eighth grade students and 25% of twelfth grade students reading at a *below basic* level of achievement (National Center for Education Statistics [NCES], 2013). At this level of performance, students exhibit little or no mastery of the knowledge or skills necessary to perform work at each

grade level (NCES, 2013). As shown by these data, many U.S. middle and high school students continue to struggle in the area of reading achievement.

The 2013 NAEP scores also revealed gender differences in reading proficiency. Results by gender showed 42% of eighth grade and twelfth grade female students reading at or above a *proficient* level of achievement compared to 31% of male eighth grade students and 33% of male twelfth grade students (NCES, 2013). The NAEP long-term trend assessment data showed that female students consistently outscored male students in reading at both grade levels between 1971 and 2013 (NAEP, 2013). The Programme for International Student Assessment (PISA) test results provide further evidence of discrepancies in reading achievement by gender, in the United States. In 2012, the largest discrepancy in academic performance between 15-year old boys and girls was found in reading. Researchers have identified this difference as the gender gap (Klinger, Shulha, & Wade-Woolley, 2009). Girls on average outperformed boys in reading in all of the countries in the OECD (OECD, 2014). Further, test scores and achievement gaps such as the ones described here were manifested particularly among middle school students in Grades 6 through 8 (Stotsky & Denny, 2012). These data demonstrate that discrepancies in reading achievement by gender, both globally and in the United States specifically, accentuate disparities in boys' literacy skills and engagement.

The local problem addressed in the study was the reading achievement gap among middle school boys and girls in a public school district in the state of Texas. In the local district, middle schools are comprised of sixth through eighth grades. To understand the context of the problem, it is helpful to examine 5 years of historical performance data by

gender. The 2007-2011 performance data in the local district showed middle school girls scoring higher than middle school boys on state reading assessments (Texas Education Agency [TEA], 2011b). The district data from the 2007-2008 school year showed that boys scored lower in reading than girls with a 6% difference between the groups. In the 2008, 2009, and 2010 school years, the difference was 4%, 5%, and 6%, respectively, indicating a steady pattern in lower reading achievement for boys than girls (TEA, 2011b).

Since the 2007-2008 school year, the district's goal has been to prepare students to be college and workforce ready (Board of Trustees Report, 2008). Of the boys in the district, 22% (n = 6,288) scored above average (i.e., achieved commended performance) on the 2010–2011 state reading assessment, compared to 28% of girls (n = 8,004; TEA, 2011a). The Commended level of performance is significant because it is associated with college readiness (TEA, 2006).

According to the reading language arts director, leaders in the local district implemented a variety of supports to address reading underachievement for struggling students, including accelerated instruction (e.g. tutoring and summer school), uninterrupted/extended blocks of instructional time, teacher professional development, and instructional coaching, with little measurable success. To streamline learning for girls, in 2004, the district opened a single-gender school for girls in Grades 7 and 8. Since its opening, the all-girls school had been rated *Exemplary* by the TEA. A campus earns the top rating of Exemplary with at least 90% of all students passing or *Meeting Standard* in each tested area (TEA, 2011c). Since the first graduating class of 2009,

100% of the graduates have been accepted into college (United States Department of Education, n.d.). In an effort to reduce the reading achievement discrepancy among middle school girls and boys and expand opportunities for boys, leaders of the school district opened the district's first single-gender school for boys in Grades 6 through 9 in August 2011. District students were among the state's first to experience single-gender public education for males.

Many educators in the United States are increasingly choosing the single-gender educational model to create the kind of educational climate and culture that can empower students to attain high levels of achievement (Rex & Chadwell, 2009). Only four public schools in the United States offered single-gender education in 1999 (Fergus & Noguera, 2010). According to information published on the National Association for Single-Sex Public Education (NASSPE) website, in the 2011-2012 school year, there were at least 506 public schools in the United States offering single-sex educational opportunities (NASSPE, n.d.). Still, what is known about the practice of single-gender education is derived from studies done in private and parochial schools in the United States and internationally (Anfara & Mertens, 2008; Bracey, 2007). The purpose of the study was to compare the two educational models to determine whether the single-gender model offered advantages over the coeducational model as measured by standardized reading test scores. This section includes the definition of the problem at the local level, the rationale, special terms related to the problem, the significance of the study, guiding questions, and a review of literature related to the problem as well as the possible implications of this study.

The Local Problem

Although some educational researchers have identified single-gender schools as having the potential to elevate academic achievement and improve attendance and discipline, there is limited evidence of the efficacy of the model (Gurian, Stevens, & Daniels, 2009; Rex & Chadwell, 2009; Sax, 2008). In one local district in Texas, administrators implemented the single-gender model to address the problem of an ongoing reading achievement gap among middle school boys and girls. The 2007-2011 performance data in the local school district showed girls scoring higher than boys on state reading assessments (TEA, 2011b). As a result, a single-gender campus for boys was introduced in 2011. The problem addressed in the study was the lack of evidence on the efficacy of the single-gender educational model as compared to the coeducational model in increasing reading achievement for middle school boys in the local school district.

Students are more likely to complete high school, earn a college degree, and succeed in most technical and professional careers when they have strong reading and writing skills (King, Gurian, & Stevens, 2010). In order for the United States to retain its standing among nations in the 21st century, a reduction in reading achievement gaps among its students is necessary, according to Bansmith (2012). Policy makers and educators have that responsibility, not only economically, but also morally (The College Board, 2012). More than ever, students need advanced reading skills to succeed in a fast-paced global economy (Whitmire & Bailey, 2010). By 2020, the bulk of job growth will be in professional, technical, and scientific services — professions that rely heavily on

strong reading skills (Bureau of Labor Statistics, 2010). As expressed here, there is a growing need for an educated citizenry in a technological society.

In an effort to reduce the reading achievement discrepancy among middle school girls and boys and expand opportunities for boys, school district officials opened first single-gender school for boys in Grades 6 through 9, in August 2011. Although the school was fully operational between 2011 and 2014, it was not known to what extent the public single-gender educational model was effective in addressing the problem of reading underachievement. In this project study, I investigated the efficacy of the single-gender education model for middle school boys enrolled in the local district during 2011-2014.

Rationale

Evidence of the Problem at the Local Level

According to the 2011-2014 district performance data, middle school girls are continuing to score higher on state reading and assessments than middle school boys (TEA, 2013a; 2014). Sixty-four percent of boys (n = 9,420) scored at or above the satisfactory level on the 2011-2012 state reading assessment, compared to 71% of girls (n = 10,290; TEA, 2013a). District data from the 2012-2013 and 2013-2014 school years showed that boys scored lower in reading than girls with a 5% to 7% difference between the groups (TEA, 2014). The differences in reading shown in this historical performance data indicate a steady pattern in lower reading achievement for boys than girls. Moreover, the inability to read put students at risk for poor educational attainment (National Education Association, 2008). Many students who academically fall behind in

middle school are unable to catch up when they reach high school. For example, 84% of boys (n = 3,390) in the class of 2014 graduated, compared to 90% of girls (n = 3,825; TEA, 2014).

While these data further support the need for the single-gender school for boys implemented in the local district, no student-level data had been analyzed to determine the efficacy of the model. Although operational for multiple school years, the influence of the program was not known. Educators and parents in the local district may benefit from an investigation of the program and its influence in addressing the problems of low reading achievement among middle school boys.

Evidence of the Problem from the Professional Literature

Few studies have been conducted in the United States on public school single-gender populations (Glasser, 2012), and even fewer studies have centered on the effects of single-gender schooling on middle school boys, according to my review of the literature. Nevertheless, with very little research to support the decision, school districts across the United States have implemented single-gender schools or classes in the middle grades (Spielhagen, 2011). The study adds to the research in this area as well as addresses the local district's gap in practice.

The purpose of the study was to compare the two educational models to determine whether the single-gender model offered advantages over the coeducational model as measured by standardized reading test scores. In order to ascertain the efficacy of single-gender education for middle school boys, I concluded after reading the literature on public single-gender education in the United States, that research-based evidence

gathered in a public-school environment is necessary. These data may help district personnel to improve instruction, as well as provide evidence for single-gender initiatives to improve the gender gap in achievement.

Definition of Terms

Coeducation model: An educational approach in which both genders learn together in the same setting (Eckes & McCall, 2013).

Gender gap: A discrepancy between the academic performance of males and the academic performance of females (Klinger et al., 2009).

Reading achievement: For this study, reading achievement refers to reading performance on the STAAR (TEA, 2011a). Scale scores are used to communicate information about student performance levels. The student performance levels are: Level III: Advanced Academic Performance; Level II: Satisfactory Student Performance; and Level I: Unsatisfactory Academic Performance (TEA, 2012a).

Single-gender education model: An educational approach where male and female students attend separate classes or schools (Bracey, 2009).

State of Texas Assessments of Academic Readiness (STAAR): The state-mandated assessment implemented in 2012 in Texas to measure Grades 3–12 students' knowledge of concepts in the core subject areas. The Grade 3–8 tests measure students' mastery of grade-relevant core subject areas, while the end-of-course tests assess students' course-specific knowledge in the core subject areas of interest (i.e., mathematics, reading, science, social studies, and writing). STAAR is separated into three performance levels:

Level III: Advanced Academic Performance; Level II: Satisfactory Student Performance; and Level I: Unsatisfactory Academic Performance (TEA, 2012a).

Significance of the Study

Local Problem

By examining the differences in reading achievement among boys in a single-gender middle school compared to boys in a coeducational middle school, I may be able to provide district leaders with data useful for making policy decisions concerning the effectiveness of the single-gender model. The findings may also influence decisions about future programs as well as the use of single-gender grouping in other schools and grade levels within the district. Empirical knowledge from study findings may be helpful to parents and students in making decisions about student enrollment. Findings may also provide teachers and administrators with suggestions for improving current educational practices. Specifically, this study's results may provide an evidence-based perspective of the efficacy of single-gender education as an alternative to coeducation for educating middle school boys.

Larger Educational Setting

This study contributes to the professional literature on public single-gender education in the United States. The topic of single-gender education has been debated among researchers in various educational environments (Mael, Alonso, Gibson, Rogers, & Smith, 2005; Riordan et al., 2008). The concrete evidence derived in this study from a public school environment can be used by educational leaders to make decisions about students. Specifically, the findings of this study may provide institutes of higher

education and educational leadership preparation programs with new data regarding reading achievement of boys in both public single-gender and coeducational schools, which could influence programs and instructional practices in middle schools. Further, the results of this study may increase knowledge and understanding about the issues surrounding reading underachievement and encourage state legislatures to provide support and resource allocations for comprehensive reading programs and professional learning opportunities in both single-gender and coeducational public schools.

Social Change

The findings from the study may also influence social change by contributing research to the professional literature on reading achievement among middle school boys in public single-gender and coeducational schools in the United States. Reading is essential for college, careers, and citizenship. Strong reading skills may lead to employment in professional, technical, and scientific services that rely heavily on such skills, researchers have found (Bansmith, 2012). Reading can have a positive effect on the school setting and community as a whole. Literate adults are more likely to become productive citizens and contributors to their families and society. Society also benefits from decreased expenditures for public assistance and incarcerations when the populace is literate, employed, and productive (Austin Independent School District, 2011). Thus, strong reading skills are the foundation of a successful adulthood.

Research Questions and Hypotheses

The No Child Left Behind Act (NCLB) propelled educational policy makers, administrators, and educators in the public sector to escalate efforts to identify the most

effective educational models that would target all students regardless of educational or societal categorization (e.g., gender or ethnicity). Researchers have found that the single-gender education model has the potential to elevate academic achievement for all students (Gurian et al., 2009; Rex & Chadwell, 2009; Sax, 2008), potentially fulfilling the mandate of NCLB. Valid and reliable results from empirical studies are needed to evaluate the single-gender model's effectiveness, however (Gurian et al., 2009).

The overarching question for this project study was the following: Is there a significant difference in reading achievement among boys in a coeducational middle school compared to boys in a single-gender middle school? The specific research questions and their corresponding hypotheses were, as follows:

RQ1. Is there a significant difference in 6th grade reading achievement among middle school boys in a coeducational middle school compared to a single-gender middle school?

H_O1: There is no significant difference in 6th grade reading achievement among middle school boys in a coeducational middle school compared to a single-gender middle school.

H_A1: There is a significant difference in 6th grade reading achievement among middle school boys in a coeducational middle school compared to a single-gender middle school.

RQ2. Is there a significant difference in 7th grade reading achievement among middle school boys in a coeducational middle school compared to a single-gender middle school?

H_O2: There is no significant difference in 7th grade reading achievement among middle school boys in a coeducational middle school compared to a single-gender middle school.

H_A2: There is a significant difference in 7th grade reading achievement among middle school boys in a coeducational middle school compared to a single-gender middle school.

RQ3. Is there a significant difference in 8th grade reading achievement among middle school boys in a coeducational middle school compared to a single-gender middle school?

H_O3: There is no significant difference in 8th grade reading achievement among middle school boys in a coeducational middle school compared to a single-gender middle school.

H_A3: There is a significant difference in 8th grade reading achievement among middle school boys in a coeducational middle school compared to a single-gender middle school.

Few researchers have focused on single-gender public school populations, and even fewer ones have centered on the effects of single-gender schooling on boys in middle school (Glasser, 2012). This study adds to the research in this area as well as addresses the local district's gap in practice. In the literature review, I discuss the studies that have been conducted on the efficacy of the single-gender education model in public middle schools.

Review of the Literature

This literature review began with a focus on the theoretical frameworks which guided the research: multiple intelligences theory and brain-based learning theory. Next, because the problem addressed in the study concerns the efficacy of the single-gender educational model, I addressed several major themes related to the single-gender educational model: the historical and current status of single-gender public education, arguments in support of and opposition to single-gender education, and biological differences in learning. Finally, I cover information and empirical research related to single-gender education and academic achievement, including but not limited specifically to, reading achievement.

The literature reviewed was collected using a systematic approach. I accessed a variety of electronic sources, databases, educational publications, as well as professional websites. Electronic databases include Education Research Complete, ERIC, ProQuest Central, Education from SAGE, Academic Search Complete, Science Direct, and Google Scholar. Key search terms and word combinations included: *adolescent literacy, reading, coeducation, single-gender education, gender and learning, single-sex education and/or single-sex schools, gender and brain development, multiple intelligences theory, brain-based learning, and biological differences in learning*. Additional resources were located from references cited in studies published in peer-reviewed journals, papers presented at research symposiums, and unpublished dissertations.

Theoretical Framework

Many theories contribute to the single-gender classroom ideology, from genetics to behaviorism (Jackson, 2010). The theoretical basis for this study was grounded in the multiple intelligences theory and brain-based learning theory, developed by Howard Gardner (1983) and Eric Jensen, respectively. Gardner developed an alternative theory of intelligence that contradicted the unitary notion of intelligence (Shearer, 2012). Gardner noted that the human cognitive competence is better described in terms of a set of abilities, talents, or mental skills, which he called "intelligences" (Gardner, 2011, p. 6). According to Gardner (2011), there are eight intelligences: interpersonal, intrapersonal, kinesthetic, linguistic, logical-mathematical, musical, naturalist, and visual-spatial. Each intelligence was thought to be developed in unique ways and in different parts of the brain (Eisner, 2011).

Gurian (2011) claimed that due to differences in brain development, boys and girls differ in five of these intelligences. Girls demonstrate strength over boys in linguistic intelligence because their brains mature earlier (Gurian, 2011; Salomone, 2013). For example, girls speak in complete sentences sooner than boys due to earlier developmental milestones of the brain in particular areas associated with communication (Gurian, 2011).

Boys tend to demonstrate strengths over girls in the logical-mathematical, visual-spatial, and kinesthetic intelligences (Gurian, 2011; Salomone, 2013). Logical mathematical strengths in boys enable them to solve abstract problems in the areas of math and science (Salomone, 2013). According to Gurian, additional brain developments

in boys promote more rapid movements and their higher levels of testosterone increase levels of aggression and competitiveness. When combined, these brain functions create strengths in the area of kinesthetic intelligence. According to Eisner (2011), boys and girls need a curriculum that is sensitive to their developmental needs and intelligences they possess. Gardner's theory is an appropriate foundation for the study of reading achievement among middle school boys in both single-gender and coeducational schools because all students have a dominant intelligence, which is the entry point for learning that provides the greatest academic achievement. Single-gender and coeducational schools could provide an opportunity to establish an environment that teaches to the strengths of the genders' individual intelligences.

Jensen's (2012) brain-based learning theory is based on the configuration and function of the brain. Evidence shows that brain-based education is a significant paradigm in the 21st century. Brain-based education employs strategies drawn from neurological studies that have increased our understanding of how individuals learn. In 1990, researchers Caine and Caine (as cited in Freeman & Walsh, 2013) created the term *brain-based learning*, an approach that deemphasized memorization and focused on a consequential form of learning, which was student-centered and centered on brain function. The present model of this type of education is highly disciplinary with data from all disciplines being used to advance student learning. Their study of the brain provided evidence that students learned best if learning was based on real world problems and applications (Jensen, 2012). As maintained by Spears and Wilson (2009), the past two decades found neuroscientists conducting research that has connotations for

improved teaching practices. University professors have proposed new teaching and learning theories based on research findings in cognition; which teachers have incorporated into their classroom instruction (Spears & Wilson, 2009). Eric Jensen is one of several recognized educators in this area. Jensen's brain-based learning theory is an appropriate foundation for this study of reading achievement in single-gender and coeducational settings because a knowledge of how a student's brain functions during learning activities can assist educators in designing classroom instruction that is tailored to meet gender differences in learning styles and preferences, subsequently enriching the learning process for each student.

Historical Perspective on Single-Gender Schools

Boys and girls were educated separately in the early days of the United States. Generally speaking, formal pedagogy was offered only to boys, while girls were trained in the domestic arts. Schools were then, by definition, *single-gender* schools. By the early 19th century, societal attitudes were beginning to change: girls could receive instruction in all-girls classes; however, often girls were only present before and after the boys' school day. By the early 20th century, coeducation became more acceptable, as the public recognized that it made sense economically. Also, it was believed that girls' compliant disposition would provide a calming quality that would prove to be a moderating influence on boys' aggressive behavior (Bracey, 2009). By the beginning of the 20th century, most public schools were primarily coeducational. Coeducation, however, did not ensure equal opportunity in education. Boys were steered toward college preparatory coursework, and girls were channeled toward vocation training

(Ferrara, 2012). Private schools remained almost exclusively single-gender until the Title IX legislation in 1972, which prohibited segregation by sex (Bigler & Signorella, 2011).

With Title IX, it became illegal to discriminate on the basis of sex in school athletics, admission practices, career counseling, financial aid, medical services, or the treatment of students in any educational institutions, whether public or private, that received federal funds (Bigler & Signorella, 2011). Title IX provided the impetus that drove the cultural trend toward coeducation. This law's influence on the education system has been far and wide, drastically changing the educational environment for girls. Since the implementation of Title IX, more girls are going to college, more girls are studying math, science, and technology, pregnant and parenting students receive more equal treatment. College campuses are being required to provide protection from sexual harassment (Winslow, 2009).

In the 1990s, federal legislators began proposing laws permitting public school districts to establish single-gender schools and classrooms. In 2001, the reauthorization of the 1965 Elementary and Secondary Education Act, commonly known as NCLB, permitted single-gender schools and single-gender classes within coeducational schools. In 2006, as directed by the NCLB law, the United States Department of Education issued regulations governing single-gender education. Together, the NCLB and 2006 amendment to Title IX, represented "a drastic change in American public policy by allowing for sex segregation in public schools—as long as it is voluntary, students are provided a substantially equal coeducational option and the segregation substantially

furthers an important governmental objective" (C. S. Brown, 2013, p. 1). Involuntary assignment to single-sex schools is prohibited.

The 2006 legislative act contains regulations that govern single-sex education in public schools. Coeducational public schools may offer single-gender classrooms if the school (Title IX of the Education Amendments of 1972, 20 U.S.C. 2006).:

- Provides a justification for offering a single-gender class (e.g., a class remedies a specific educational imbalance).
- Offers a coeducational class in the same subject at a "geographically accessible" location; however, "geographically accessible" is not defined.
- Performs a self-conducted review of the status every 2 years to determine whether the single-gender class is still needed to remedy the previous imbalance (Title IX of the Education Amendments of 1972, 20 U.S.C. 2006).

If a public school district operates solely single-sex schools, rather than offering girls only or boys-only classrooms within coeducational schools, the school district is exempt from these requirements. This regulation means that a school district may offer a single-sex school for one gender without having to offer a single-sex school for the other. It is also important to note that charter schools are exempt from all three legislative requirements.

Current Status of Single-Gender Schools

The number of public K-12 coed schools with single-sex classes as well as all-girls and all-boys populations insignificantly increased after the enactment of Title IX regulations in 2006, which made establishing single-sex K-12 public education easier.

Only four public schools in the nation offered single-gender education in 1999 (NASSPE n.d.). In the 2011-2012 school year, at least 506 public schools in the United States offered single-sex educational opportunities, and only 116 of the 506 schools were single sex schools (NASSPE n.d., para. 1). However, when considering the 15,746 school districts in the United States, the amount of schools implementing the single-gender model remains extremely modest (Snyder & Dillow, 2015).

The Single-Gender Education Debate

Research on single-gender education has to date been inconclusive. As a result, educators and researchers on both sides of the single-gender education debate argue theoretical advantages and disadvantages to coeducational and single-gender schools. Completed studies that have focused on students' academic attainment in single-gender private schools in the United States as well as public and private schools in other countries have resulted in policy recommendations (Mael et al., 2005; Riordan et al., 2008). However, there is no clear indication as to best practices for single-gender educational systems since no reviews of research comparing single-gender and coeducational settings have been systematically conducted (Bigler & Signorella, 2011); and many of these research studies are flawed due to the outcomes being equivocal (Sax, 2005). This situation exists because minimal research has been conducted in public school settings in the United States (Pahlke, Hyde, & Allison, 2014).

Possible selection biases must be considered in conducting research and assessing the value of single-gender schooling (Hayes, Pahlke, & Bigler, 2011; Hoffung, 2011). Student-driven and school-driven selection biases can be instrumental in shaping the

student population being studied. In student-driven bias, students who opt to attend single-gender schools may be more academically gifted and goal-oriented than students who prefer to study at coeducational institutions (Riordan et al., 2008). In school-driven bias, administrators select students to attend single-gender schools based on varying criteria which may result in skewed student bodies.

Another factor in student population which should be considered when evaluating single-gender education is the diverse character of education providers (Hayes et al., 2011). Many single-gender public schools are charter and magnet schools and may have competitive admissions procedures.

Adequately control for selection bias has not existed in previous research that has focused on these competitive-admissions schools (Hayes et al., 2011). Prior studies have also failed to control for other key variables that can affect educational achievement, including prior learning, race, ethnicity, socioeconomic status, religious values, or English language proficiency (Bracey, 2009; Signorella, Hayes, & Li, 2013).

Results of research studies thus far are vague, although some support for the proposal that single-gender schooling can be helpful does exist (Bryk, 2008; Ready & Lee, 2008; Riordan, et al., 2008); especially for outcomes related to academic achievement and more positive aspirations, while others studies have found no advantages (LePore & Warren, 1997; Shmurak, 1998; Wood & Brown, 1997). For many studies, however, there is no evidence of either benefit or harm of single-gendered schooling (Corbett, Hill, & St. Rose, 2008; Signorella et al., 2013; Singh, Vaught, & Mitchell, 1998). Several studies have suggested that some groups do benefit

educationally from single-gender schooling, such as girls, at-risk students, and Hispanic and African-American boys and girls. These same studies also found that Caucasian males only benefit slightly or demonstrate a neutral outcome (Foundation for Education Reform & Accountability, 2006). Clearly, additional research needs to be conducted. As it now stands, there is no definitive answer to support either point of view.

Proponents of single-gender education contend that girls are at a disadvantage in certain areas in coeducational classrooms. These educators assert girls derive greater academic success in all-female classrooms, particularly in STEM disciplines, than they do in traditional coeducational classrooms (Watt et al., 2012). Girls are less confident around boys in the classroom, more hesitant to try new things, or to take the lead or to show off their math, science and technology skills (Sax, 2008). Looking at previous research, a study commissioned by the American Association of University Women (AAUW) concluded that teachers are less attentive to girls than they are to boys. Additionally, boys are more intellectually challenged and are more often asked more abstract and complex questions than are girls.

The experiences children have in school can shape their lifetime learning patterns. Teachers' and administrators' attitudes towards the different temperaments and abilities of the genders are often picked up on by children and can have a lasting effect on student self-esteem and achievement (Skolnick, 2011). Sadker, Sadker, and Zittleman (2009) maintained that teacher education programs do not adequately prepare teachers to "'see' the subtle, unintentional, but damaging gender bias that characterizes classrooms" (p. 80).

Supporters for boys-only schools point to Stetson University research to demonstrate that boys can make significant educational advances in all-boys classrooms, which were even greater than the advances made by girls in all-girls classrooms (Heins, MacIsaac, Piechura-Couture, & Tichenor, 2012). The 3-year study looked at single-gender classrooms and coeducational classrooms in an elementary school. The Florida Comprehensive Assessment Tests administered at the completion of the study showed that 37% of boys in coeducational classes scored proficient in writing compared with 86% of boys in single-gender classes and that 59% of girls in coeducational classes scored proficient in writing compared with 75% of girls in single-gender classes (NASSPE, n.d., para. 11). A University of Virginia study in 2003 found that boys in single-gender schools were more than twice as likely as boys in coeducational settings to pursue subjects such as art, music, drama, and foreign languages, countering gender stereotypes (James, 2015, p. 163).

Researchers assert that both options should be available to children since children respond in different ways to diverse educational settings. "For some children, single-sex classrooms will yield the best results, while a different environment will be most suitable for others" (Kafer, 2009, p. 415). It is a false dichotomy that schools and classrooms must be either coed or single-gender. Single-gender education does not preclude coeducational reform for the benefit of all boys and girls (Foundation for Education Reform & Accountability, 2006). Both single-gender and coeducational reform should be available for all students and policy makers should focus on offering parents more school choice for their children (Carpenter & Kafer, 2012). In fact, although advocates

of single-gender schools have used research conducted by the AAUW, the AAUW's position paper states its belief that the 2006 regulations cross a constitutional line. The position paper holds that the regulations deprive girls of constitutional protections. Therefore, the organization favor reforming coeducation to serve both girls and boys, rather than segregating the genders (AAUW, 2013).

Analyses of results from national standardized tests (e.g., NAEP) and college entrance examinations (e.g., SAT and ACT) indicated that the achievement gap fell along racial, ethnic, and economic lines, rather than along a gender one. Test scores demonstrated substantial disparities in academic achievement. Corbett et al. (2008) termed the situation a "crisis" because these long-standing inequalities required immediate action. The crisis, however, was not specific to boys; rather, a crisis for Hispanic, African American, and low-income children.

Some experts agree with AAUW's position that broad-based reform to coeducational schools is the better direction to remedy gender variances in educational achievement and expectations. Strategies that have been proven to be successful practices in schools, regardless of the gender makeup, include: smaller classes and more individual attention; as well as teacher training in gender differences, gender equity, and diversity (Government Accounting Office, 1996). In the view of these educators, "Separating the sexes should not be viewed as a simple solution to complex problems and that program goals, content, and desired outcomes must be carefully scrutinized" (Government Accounting Office, 1996, p. 8).

Biological Differences in Learning

Existing brain research has confirmed that males and females show group differences in brain structure, chemistry, and function (Canadian Council on Learning, 2009; Klinger et al., 2009; Society for Women's Health Research, 2008; Zaidi, 2010). During the last 20 years, research in the fields of neuroscience, psychology, biology, and medicine have identified over 100 structural differences in the brain of both genders (Gurian & Stevens, 2010).

Much of the work by Sax (2008) hinged on the differences identified in the male and female brain in terms of development and learning preferences (Anokhin, Lutzenberger, Nikolaev, & Birbaumer, 2000; Hanlon, Thatcher, & Cline, 1999; National Institute of Mental Health [NIMH], 2007). These studies found that the regions of the brain develop in a different sequence between boys and girls; the areas of the brain that control spatial memory, language, social skills, and motor coordination develop in a different order, time, and rate in the genders. The results from the NIMH study (2007), one of the largest studies of children's brain development in the world, were consistent with previous findings that the gray matter volumes of the females' brains peaked approximately 1 to 2 years earlier than males, which corresponds with the average age difference at puberty (De Bellis et al., 2001; Giedd et al., 1999).

In addition to structural and developmental differences, there is widespread evidence suggesting that male and female brains are organized differently. Researchers have identified significant gender differences in the functional organization of the brain related to working memory (Goldstein et al., 2005; Li, Lu, & Gong, 2010; Speck et al.,

2000). During all of the working memory tasks, men showed right hemisphere dominance while women primarily activated the left hemisphere. However, when it comes to language, researchers found that men use the left hemisphere of the brain for receiving and generating language and women use both hemispheres (Zaidi, 2010). A growing body of research has also suggested to researchers that the female brain has a thicker corpus callosum, the linking collection of tissue between the left and right hemispheres of the brain, than the male brain (Zaidi, 2010). Researchers have concluded that the increased thickness may be responsible for the female brain's superior cross-hemispheric communication (Ganjavi et al., 2011).

An abundance of evidence suggests that the females' brains process language earlier, faster, and more easily than the male brain (Canadian Council on Learning, 2009; Harper & Pelletier, 2008; Skinner, Kindermann, & Furrer, 2009). In contrast, males demonstrate keener spatial-mechanical and gross motor skills, especially skills involving spatial perception and mental rotation (Burman, Minas, Bolger, & Booth, 2013). Although males and females appear to use different hemispheres for specific tasks and demonstrated strengths in opposing areas, there is no evidence to suggest that one gender demonstrated a higher Intelligence Quotient (IQ) than the other (Halpern, 2012; Halpern et al., 2011). In fact, evidence suggests that males and females use different areas of the brain to attain similar IQ levels (Cosgrove, Mazure, & Staley, 2007).

A growing body of evidence shows that males and females have different learning styles and preferences in addition to physiological differences in brain development. Wehrwein, Lujan, and DiCarlo (2007) surveyed the preferred learning styles of

physiology undergraduate majors to determine whether males and females have similar learning styles. Using the Visual, Aural, Read/Write, and Kinesthetic (VARK) inventory tool for assessing individual learning style preferences, Fleming and Mills (1992) found that among the 86 undergraduate physiology majors who completed it, not all students learned from the traditional lecture learning style format. Moreover, Fleming and Mills (1992) demonstrated that there are gender differences in learning styles; men tended to be multimodal and women unimodal. In a similar study, Philbin, Meier, Huffman, and Boverie (1995) investigated the differences in learning styles between men and women, finding that men and women learn in different ways. Broadly speaking, men seemed to find a greater similarity between traditional education and their learning style while women did not (Philbin et al., 1995). The learning style work of Belenky (2010) and Kolb (1984, 1994) provided the framework for this study. The Kolb Learning Style Inventory, 12 Educational Dialectical questions, and a subjective questionnaire was administered to 72 subjects.

Although a significant quantity of research supports the assertion that there are gender-based differences in the brain's chemistry, structure, and function, some critics believe that the differences presented by neuroscience to explain human behavior too readily accepted (Weisberg, Keil, Goodstein, Rawson, & Gray, 2008). Eliot (2011) evaluated the claims that boys' and girls' brains differ in ways that are meaningfully related to education. Eliot (2011) also argued that false claims about gender differences have influenced teachers' views about single-sex education and pedagogical practices. In review of claims made concerning gender learning differences by proponents of gender-

specific educational strategies, Eliot (2011) addressed each assertion and highlighted the problem of over-generalizing and misinterpreting the findings of brain research in the education field. Kaiser, Haller, Schmitz, and Nitsch (2009) suggested that there is a disproportionate amount of published data supporting gender differences in brain research as opposed to research showing no differences between the sexes. More noteworthy, research has found that the brain is too complex for individual differences attributable to gender variations, it has an incredible ability to reorganize itself by creating new neural connections throughout one's lifespan (Garon & Moore, 2004; Green, Barnea, & Herzberg, 2008; Weis & Cerankosky, 2010).

Academic Outcomes

Many researchers have investigated increased academic achievement as a potential outcome of single-gender education (Riordan, 2014). Academic outcome variables include objective performance on various subject tests and/or high-stakes standardized tests. With the growing popularity of single-gender public schools, it is critical that educators, policy makers, and the public have valid data concerning the role that single-gender schooling plays in providing an effective learning environment for students, as compared to that of coeducational schooling.

For example, Stephens (2009) studied the effects of single-gender classes on math and reading achievement. The participants of his study consisted of 23 males in the single-gender class, 18 females in the single-gender class, and 22 males and females in the coeducational class. The same curriculum and instructional strategies were used in all classes, in the study. The AIMSweb Reading Curriculum-Based Measurement (CBM),

the Maze CBM, the Mathematics CBM, and pretest/posttest were used to gauge academic achievement.

The results of the study showed a significant difference ($p \leq 0.001$) for mathematics computation. Bonferroni post hoc scores indicated a significant difference between the male single-gender ($M = 23$) and the male coeducational ($M = -2.77$) classes ($p \leq 0.001$), and it indicated a significant difference between the female single-gender ($M = 23.39$) and the female coeducational ($M = -2.77$) classes ($p \leq 0.001$). The results showed significant differences in oral reading fluency scores ($p \leq 0.005$) and significant differences between the male single-gender ($M = 32$) and the coeducational ($M = 13.32$) scores ($p \leq 0.01$). The test also indicated a significant difference between the female single-gender ($M = 31.78$) and the coeducational ($M = 13.32$) scores ($p \leq 0.019$). The results showed the effect of class type was significant on the reading comprehension scores ($p \leq 0.023$) and a significant difference between the male single-gender ($M = 7.26$) and the female single-gender ($M = 11.83$) classes ($p \leq 0.019$; Stephens, 2009).

However, another study examining the difference in mathematics achievement related to single-gender and traditional classroom students concluded that on the state assessment, there were no significant differences in the levels of achievement (Sutton, 2009). A subsequent study by Vrooman (2009), whose data were drawn from 3 years of middle school student test scores (i.e., 2006, 2007, and 2008) and Grades 6, 7, and 8, yielded mixed results. There were significant findings for mathematics in the single-gender classroom settings for all three grades and no significant findings for either grade or classroom in reading. Likewise, findings from van de Gaer, Pustjens, van Damme,

and de Munter (2009) yielded mixed results. Van de Gaer et al. (2009) compared coeducational and single-sex environments, and found boys achieved higher in language skills, but not in mathematics. Since males normally lag behind females in language development, the researchers hypothesized the lack of females in the setting forced boys to grow in language skills. The opposite effect was discovered for females. The single-gender classrooms showed no effect on the females in English but did show benefits for the girls in mathematics. Van de Gaer et al. (2009) hypothesized the effect was due to fewer distractions, higher confidence, less stereotyping by school faculty, and more positive perceptions of typically male-dominated subjects. The findings showed that, for females, the school composition was more important than the classroom composition (van de Gaer et al., 2009).

In another research effort, Olson (2010) evaluated the effectiveness of same-sex classrooms at the elementary level to determine if there was a statistically significant difference among student performance scores in mathematics and reading among same-sex classrooms compared to coeducational learning environments. Olson (2010) found that students in the same-sex classrooms reflected higher scores in comparison to students in the coeducational classrooms. A second study resulted in a different outcome. That study involved 241 students enrolled in coed and single-gender mathematics classes, in a public charter school. The results were largely non-significant for gender and class type (Kawasha, 2010). Another researcher, Brathwaite (2010), found some support for the theory that girls and boys achieve significantly better academically in single-sex settings compared to students in coeducational settings. However, the study yielded mixed

results. In some cases, the single-sex setting showed more positive statistically significant findings, in other cases the coed setting was rated higher, while other settings' outcome was neutral. Nonetheless, Brathwaite (2010) concluded that in the areas of behavior and attendance, the single-sex classroom appeared to offer a more positive environment for students. Since this fosters academic achievement, it is recommended that the single-sex option continue to be studied.

Five additional studies address students attending single-gender classes and schools with a comparison group. Sago (2011) studied the effects of single-gender education on inner-city African American males in Grades 7 through 12. There were 20 participants enrolled in three different types of schools involved in the study. Surveys, interviews, and archival data were used. The survey results showed that the males overall had favorable impressions of the single-gender experience. The archival data showed that 32% of the students in the single-gender program improved in conduct grades and test scores. The interview results found the participants in the single-gender programs reported greater success in school. Overall, the single-gender program had a positive effect on behavior, feelings, and academics (Sago, 2011).

Hayes, Pahlke, and Bigler (2011), however, researched performance scores that had been collected over three years for girls attending public single-sex middle schools and girls attending coeducational schools in the Southwestern United States. After controlling for selection and peer quality effects variables, Hayes et al. (2011) found no significant effect of the gender composition of schools on student's achievement. Similarly, Goodkind (2013) conducted a critical theoretical review of the literature on

single-sex public education and found no academic benefits to single-sex public education for low-income youth of color in the United States. Goodkind (2013) analyzed three main justifications offered by supporters of single-sex education for low-income youth of color, it will: (a) exclude distractions from the opposite sex; (b) modify learning styles to meet the different needs of girls and boys; and (c) address past inequities experienced by low-income populations of color. Also, the researcher cited findings from the Hayes et al. (2011) quantitative study as empirical support for the conclusion.

Cherney and Campbell (2011) found an inconsistent pattern of outcomes in academic performance in math performance for high school students in single-sex and co-ed schools. When Cherney and Campbell (2011) compared mathematics test scores for boys in all-boy schools and girls in all-girl schools, to boys and girls in coeducational schools, they found that the students in the single-sex schools outperformed the students in the coeducational schools. In contrast, in the coeducational schools, girls scored higher than boys, while in single-sex schools, boys outscored girls. The result of the study concluded that there was no clear advantage to either school environment.

Stotsky and Denny (2012) examined achievement in two public, coeducational elementary schools to find out whether single-sex classes made a difference in boys' reading gains in 2008–2009 school year, as determined by scores on the state's annual reading test. Stotsky and Denny (2012) compared group means with "a one between (type of class), one within (year of test) repeated measures analysis of variance using the .05 level of statistical significance" (p. 10). The study matched individuals' test scores with their scores from the previous year. A statistically significant interaction term

indicated the effect the program had on the student's reading skills. Boys in single-sex classes were compared to boys in mixed classes, and girls in single-sex classes were compared to girls in mixed classes (Stotsky & Denny (2012).

The single-sex classes in the two elementary schools showed mixed results (Stotsky & Denny (2012). In one school, boys in the single-sex class improved significantly more on the state reading assessment than boys in the coed class; however, in the other school, boys in the single-sex class showed no significant change compared to the boys in the mixed class, but they did gain significantly less on a nationally norm-referenced reading test than boys in the mixed class. In contrast, trends in gain scores for boys and girls in reading favored the single-sex classes (Stotsky & Denny, 2012). Currently, the influence of single-gender classroom education on academic outcomes is unclear. As shown above, some studies indicate positive differences between school types while others show minimal academic gains or inconclusive results.

Implications

To date, it is not known to what extent the public single-gender educational model is effective in addressing the problem of reading underachievement, specifically for middle school boys. The project study investigated the efficacy of the single-gender educational model for middle school boys. The findings from the completed study resulted in a white paper, which may assist in decision making regarding the continuation or expansion of the single-gender program in the local district and aid in making related recommendations. A summary of the key findings combined with the literature review, form the foundation of the white paper and inform the recommendations made to the

local district. Additionally, the results of the investigation of the model within the local district will be shared with other educational entities interested in the efficacy of the single-gender educational model for middle school boys.

Summary

The problem addressed in the study was the lack of evidence on the efficacy of the single-gender educational model as compared to the coeducational model in increasing reading achievement for middle school boys in the local school district. Performance data showed girls consistently outperformed boys on state assessments of reading (TEA, 2011b). The purpose of the study was to compare the two educational models to determine whether the single-gender model offered advantages over the coeducational model as measured by standardized reading test scores. Published research and anecdotal literature focusing on single-gender education are not conclusive. Evidence that single-gender education might provide some academic benefits to females, minority students, and at-risk students has been published (Riordan et al., 2008). Single-gender education may also help close the gender gap in some academic disciplines (Mael et al., 2005). Some educational researchers identified single-gender schools as having the potential to elevate academic achievement as well as improve attendance and discipline. To date, however, research has focused on dissimilar populations and, therefore, cannot be relied upon for conclusions about single-gender education in the public school environment. For example, the majority of available literature concerns single-gender education in private, parochial, or international settings. The review of the current literature suggested further exploration of the public single-gender educational issue

would be valuable. Two middle schools (i.e., one single-gender and one coeducational) from an urban school district in Texas were the setting for the study. I analyzed archival data to determine differences between school types as measured by standardized reading and test scores.

In Section 2, I describe the methodology used in the study. Topics developed in this section included research design and approach, setting and sample, instrumentation, data collection and analysis, assumptions, limitations, scope, and delimitations. Also, I presented measures taken to protect the participants in the study.

In Section 3, I focus on the project, including the goals, rationale, and an extensive review of the literature, plan of implementation, plan for project evaluation, and implications for social change. The Section 4 discussion is about the strengths and limitations of the project addressing the problem and recommendations for addressing the problem differently. This section also includes my reflections on scholarship, project development and evaluation, as well as leadership and change. This section concludes with an overall reflection on the importance of the research, what I learned during this process, and a discussion of the implications, applications, and directions for future research.

Section 2: The Methodology

Research Design and Approach

I used a quantitative cross-sectional causal-comparative research design to determine whether the single-gender model offers advantages over the coeducational model as measured by standardized reading test scores. Researchers conducting studies with causal-comparative, or ex-post facto, designs attempt "to explain differences between groups by examining differences in their experiences" (Lodico, Spaulding, & Voegtle, 2010, p.13). In causal-comparative research, preexisting groups are used, and there is no manipulation of an independent variable because the variable occurred at some point in time prior to measurement of the dependent variable (Fraenkel & Wallen, 2006). Furthermore, in causal-comparative research designs, participants or groups of participants are neither randomly selected nor randomly assigned. Instead, the researcher selects a group that has the independent variable, which is considered the experimental group, and then selects another group of participants that do not have the independent variable, which is considered the control or comparison group (Lodico et al., 2010).

I analyzed archival data from the study district for 386 boys who were enrolled, but not necessarily continuously, in Grade 6 in 2011-2012, Grade 7 in 2012-2013, and Grade 8 in 2013-2014. The independent variable was school type (either single-gender or coeducational), and the dependent variable was standardized reading test scores. The data for these school years were the most recent data available from the school district.

Justification and Connection to Local Problem

The students studied belonged to preexisting groups. The schools were already established as either single-gender or coeducational campuses, and the students chose to attend, or were assigned to, the schools prior to this study. The schools determined students' assignment to the categories of ethnicity, economically disadvantaged, mobility, and limited English proficient and reported it to the TEA.

I considered other methods of quantitative inquiry, but they were deemed less effective in determining whether single-gender schools made a difference in student achievement. For example, like causal-comparative research, experimental research involves comparing groups to see if an independent variable has caused a change in a dependent variable. What makes this research distinctive from causal-comparative is that the "researcher controls or manipulates one or more independent variables and examines the effect that the experimental manipulation has on the dependent variable or the outcome of the study" (Lodico et al., 2010, p. 178). Experimental research was not appropriate for this study because groups were already formed and already different in terms of the independent variable (i.e., whether they attended a single-gender or coeducational school).

Another quantitative design considered was survey. Survey research was also not appropriate for this study because survey results describe trends in a large population of individuals rather than explain whether an intervention influences an outcome for one group as opposed to another group (Creswell, 2015; Graham, 2016). The final quantitative design considered was correlational. Correlational research involves

collecting data to determine the degree to which a relationship exists between two or more variables. This methodology requires that a researcher study a single group of individuals rather than two groups, as in this study (Creswell, 2012; Lodico et al., 2010). As the major focus of this study was on whether the two groups differed with respect to the dependent variable, I concluded that the correlational research design was inappropriate.

All quantitative research approaches summarize results numerically. However, as described in this subsection, the approaches differ in the goals and procedures used to collect data (Lodico et al., 2010). I selected a quantitative causal-comparative research design due to the nature of the research questions. In addition, I analyzed 3 years of comparable archival data to examine the effect of school type on reading achievement.

Setting and Sample

Setting

I selected the two schools participating in this study from the population of middle schools in an urban school district. In August 2011, district officials opened one of the first all-male public (and noncharter) schools in Texas. The school was matched to a coeducational campus in the school district, resulting in a pair of matched schools comprised of one single-gender school and one coeducational school. These schools have demographic similarities that enable the performance of the students to be compared.

The selection of the participating schools was conducted using purposive sampling technique. According to Gay, Mills, and Airasian (2012), purposive sampling is

used when the researcher intentionally selects a sample believed to be representative of a given population. In this study, I specifically focused on the academic achievement of males attending a single-gender public middle school and males attending a coeducational public middle school. Therefore, the use of purposive sampling was appropriate for this study. Lipsey's (1990) power analysis table was used to determine the appropriate sample size for each of the two samples: the single-gender sample and the coeducational sample. A power analysis is used to identify the optimum sample size for group comparison, based on a significance level of .05 (alpha), a power standard of .80, and an effect size of .25 (Creswell, 2015, p. 611). Using these specifications, a minimum of 64 participants in each group was needed for this one-way ANOVA study.

The one-way ANOVA depends on balanced and normal populations. Unbalanced and small sample sizes can threaten the validity of studies in which a one-way ANOVA is used to analyze data (Gravetter & Wallnau, 2017). The sample sizes for the coeducational school were relatively small since only the male population was included in this study. Also, the sample sizes between the school types were unbalanced. Consequently, the small, unbalanced sample size reduces the ability to make generalizations based on the findings. However, I believe, study findings may still provide insight into reading achievement among middle school boys in the local district.

The TEA assigns each campus to a unique comparison group within the same campus type (elementary, middle, high school) that closely matches that school on six demographic characteristics. Using the TEA designations, the characteristics are ethnic distribution (African American [African Am], Hispanic, White), economically

disadvantaged (ED), English language learners (ELL), and mobility rate. I used the same characteristics in this study to determine the comparison campus. I compared the middle schools based on the most predominant demographic characteristic. Then, the next highest characteristic was used, and so on until the school that most closely matched the single-gender school was chosen for inclusion in the study. Table 1 shows the demographic characteristics compared in determining the selection of the comparison school.

Table 1

Comparison Criteria in Percentages for the Selected Middle School Campus Reported by Year

Year	Group	*N*				Ethnicity		
			ED	ELL	Mobility	Hispanic	African Am	White
2011-12	S1	167	77.4	17.3	-	42.3	54.2	2.4
	C1	156	83.1	10.8	2.8	74.3	17.4	5.3
2012-13	S1	241	80.2	16.1	8.6	47.5	48.8	2.5
	C1	179	82.1	11.4	1.7	77.2	13.7	6.5
2013-14	S1	270	77.8	19.6	4.9	55.2	42.2	1.9
	C1	183	82.3	14.1	1.6	75.5	13.2	7.2

Note. S1 = single-gender; C1 = coeducational; *n* = male student enrollment; ED = economically disadvantaged; ELL = English language learner; - = no data (mobility is based on prior year data).

In the study, I focused on a single-gender school, S1, and a coeducational school, C1. The student populations were enrolled in six through eighth grades. The male single-gender school was matched to a coeducational campus in the school district with similar student compositions using the TEA Accountability Manual Model. Ethnicity,

socioeconomic status, English proficiency, and mobility have all been found to be "statistically related to performance" (TEA, 2013b, p. 115). Since the schools were matched in geographic location, ethnicity, socioeconomic status, English proficiency, and mobility, the differences found in student outcomes could be attributed to the school type.

Sample

The sample for this study consisted of male students ($N = 386$) who were enrolled in two middle schools during 2011-2012, 2012-2013, and 2013-2014 school years. Of this enrollment, 256 students attended the single-gender school and 130 attended the coeducational school. The sample population was comprised of, 147 sixth grade students (2011-2012), 127 seventh grade students (2012-2013), and 112 eighth grade students (2013-2014). Some, but not all, of the students were continuously enrolled during the three years. Analyzing data from these distinct groups was an opportunity to examine differences among male students in a similar geographic location who attended different school types.

Instrumentation and Materials

Description of the State of Texas Assessments of Academic Readiness

In the state of Texas, students take an annual state assessment, the *State of Texas Assessments of Academic Readiness (STAAR)*, which is a criterion-referenced test that measures individual student performance of the statewide content standards identified through the writing, reading, mathematics, science, social studies assessments (TEA, 2012c). This assessment was first administered in the spring of the 2011-2012 school year. It is comprised of multiple-choice and constructed-response items addressing the

content standards for the grade level and subject and uses a set time limit for each subtest. Under the administration of school personnel, students take the STAAR test following standardized testing procedures. Teachers are trained to follow the specific administration of the test. Test directions are read as written and students are monitored throughout the assessment, ensuring that they are correctly recording their answers.

Scoring of the STAAR

Tests are sent to the Pearson Educational Measurement in Austin, Texas, for scoring and reported to the district approximately 25 days later. Raw scores for each of the content areas are the actual number of correctly answered questions out of the actual number of questions possible. As the exam varies year to year, the raw scores also vary. Raw scores, however, are converted to scale scores, a distinct range of scores that is different for each content area and each grade. These scale scores, set by a psychometric team hired by the TEA, remains the same year to year although the raw scores may be reformulated annually prior to the conversion (TEA, 2012c). For evaluation purposes, scale scores are reported for each student and each grade level and used to communicate information about student performance levels. Each testing year STAAR scores are banded into three performance levels: Level III: Advanced Academic Performance; Level II: Satisfactory Student Performance; and Level I: Unsatisfactory Academic Performance. Students scoring at the satisfactory performance level are considered to be ready for the next grade or course and are expected to perform on grade level. Students in this *satisfactory* classification have critical thinking skills that enable them to master situations presented in familiar contexts but may require a degree of additional instruction

that focuses on the skills they are lacking. The students who score at the advanced performance level are considered to be well prepared for the next grade or course and should exceed expectations for that grade. They demonstrate the critical thinking skills that enable them to master situations presented in contexts, both familiar and unfamiliar. Students in this classification are thought to require little or no academic assistance (TEA, 2012b). Table 2 includes the actual range of scores for each of the performance levels for the 2011-2014 school years.

Table 2

STAAR Scale Score Ranges and Academic Performance Levels Reported by Year, Grade, and Subject (Reading [R])

Year	Grade	Level I: Unsatisfactory	Level II: Satisfactory	Level III: Advanced
2011-2012	6 (R)	869-1497	1504-1696	1718-2080
2012-2013	7 (R)	929-1543	1556-1739	1753-2141
2013-2014	8 (R)	960-1562	1575-1762	1783-2177

By referencing the performance levels in Table 2, a student's scale score on the STAAR is easily classified as Level I, II, or III. These levels were appropriately referenced when referring to the data sets.

Reliability and Validity of the STAAR

Reliability of the STAAR is reported in terms of its internal consistency. The internal consistency of the STAAR assessments is evaluated annually using the Kuder-Richardson 20 and the stratified coefficient alpha. For the STAAR assessments

administered in spring 2012, "the internal consistency estimates ranged from 0.81 to 0.93, which is considered highly reliable" (TEA, 2012c, p. 109). Evidence to support validity is based on and organized into five categories: internal structure, response processes, test content, consequences of testing, and relations to other variables. "The Texas Technical Advisory Committee (TTAC), a panel of national testing experts, created specifically for the Texas assessment program, provides ongoing input to TEA about STAAR validity evidence" (TEA, 2012c, p. 111). Assessment validation is a matter of degree and is an ongoing process.

Data Collection and Analysis

The single-gender school and coeducational comparison school were identified using the TEA website. The study controlled for ethnicity, economically disadvantaged populations, English language learners, and mobility rate by the selection of a matching comparison school since these characteristics are defined by state statute and considered to be statistically related to performance.

Description of Data Collection Processes

I employed a quantitative causal-comparative research method to investigate the relationship between the independent variable, school type, and the dependent variable, reading test scores. Performance measures for this study came from archival data reported for STAAR reading. The collection of student-level data for research purposes in the local district required prior approval. I submitted the proposed study to the district's Evaluation and Accountability Department and received approval to conduct the study, using district data. After the data were compiled, the chair of the Research Review

Board (RRB) transferred it from the district's database to a personal flash drive belonging to me. The data set included three years of data for male students who were in Grade 6 in 2011-2012, male students who were in Grade 7 in 2012-2013, and male students who were in Grade 8 in 2013-2014 at the two participating schools. Each student's data set included a (a) generic identification number, (b) gender (for verification), and (c) reading scale scores and the corresponding performance level for the years 2011-2014. The use of generic identification numbers de-identified all data to ensure anonymity.

After obtaining Walden University Institutional Review Board (IRB) approval (03-03-16-0150906), archival data were collected from the local school district then transferred to an Excel spreadsheet and organized into de-identified data sets. An example of the data spreadsheet is in Appendix B. A one-way ANOVA and Kruskal-Wallis H tests were used to analyze the archival data from the STAAR to determine if there were significant differences between school types as measured by the dependent variable, reading test scores.

Nature of the Scale of Variables

Inferential statistics are the tests used to make inferences about a population based on the statistics from a sample and causal-comparative studies employ this to draw conclusions. Green and Salkind (2011) explained that an ANOVA, a parametric test of significance, is used to test hypotheses about differences between group means. With an ANOVA, each case must have scores on the grouping variable and the test variable. The grouping variable divides cases into two mutually exclusive groups or categories using nominal data, and the test variable uses interval data to differentiate each case on

quantitative dimension. The ANOVA reveals whether the mean value of the test variable differs significantly from one group to another. For this study, single-gender and coeducational were the categories for the grouping variable school type (i.e. nominal data), while the test variable was reading achievement data (i.e. interval data).

Research Questions and Hypotheses

As this study was designed to determine any advantage or differences among students who attended a school with either a single-gender or coeducational classroom model, I compared reading test scores for students who were enrolled in Grade 6 (2011-2013), Grade 7 (2012-2013), and Grade 8 (2013-2014) at both the single-gender and coeducational schools. The specific research questions and their corresponding hypotheses were, as follows:

RQ1. Is there a significant difference in 6th grade reading achievement among middle school boys in a coeducational middle school compared to a single-gender middle school?

H_O1: There is no significant difference in 6th grade reading achievement among middle school boys in a coeducational middle school compared to a single-gender middle school.

H_A1: There is a significant difference in 6th grade reading achievement among middle school boys in a coeducational middle school compared to a single-gender middle school.

RQ2. Is there a significant difference in 7th grade reading achievement among middle school boys in a coeducational middle school compared to a single-gender middle school?

H_O2: There is no significant difference in 7th grade reading achievement among middle school boys in a coeducational middle school compared to a single-gender middle school.

H_A2: There is a significant difference in 7th grade reading achievement among middle school boys in a coeducational middle school compared to a single-gender middle school.

RQ3. Is there a significant difference in 8th grade reading achievement among middle school boys in a coeducational middle school compared to a single-gender middle school?

H_O3: There is no significant difference in 8th grade reading achievement among middle school boys in a coeducational middle school compared to a single-gender middle school.

H_A3: There is a significant difference in 8th grade reading achievement among middle school boys in a coeducational middle school compared to a single-gender middle school.

Assumptions, Limitations, and Scope and Delimitations

Assumptions

Certain assumptions were made during the completion of the study. I assumed that the single-gender school and the coeducational school effectively taught the core

curriculum with fidelity and that teachers in the participating schools were highly qualified. I also assumed that the curricula in both the single-gender school and the coeducational comparison school were based on state educational standards—Texas Essential Knowledge and Skills (TEKS).

Limitations

There are several potential limitations of the study. The participating schools were limited to public middle schools in Texas. Also, the study included only one male single-gender public school even though there are other male and female single-gender public schools operating in Texas. In addition, the only subject area used for this study was reading. Further, findings from the data analysis cannot be generalized to the larger population of middle schools because the participating schools were not selected randomly, and only two schools were used. Finally, the insufficient sample sizes contributed to the limitations of this study. The statistical power analysis states the necessity of $n = 64$ students per group to obtain the absolute minimum power of .80. The three coeducational sample sizes consisted of (45, 44, 41) in the sixth, seventh, and eighth grades, respectively, thus jeopardizing the findings from the data analysis.

Scope and Delimitations

The study was restricted to only assessing archival data of two middle schools (one single-gender and one coeducational) in northern Texas; thus, the ability to generalize to the entire population of middle-school males in Texas and beyond its borders are limited. It may be possible that the sample may be generalized to similar demographic areas within the state. Another male single-gender public school opened in

southeastern Texas in August 2011. Two additional male single-gender public schools opened in northern Texas in August 2012, and another school opened in central Texas in August 2013. Although these other single-gender schools were operational, they were not included in the study.

Protection of Participants' Rights

The data collection process began after IRB approval (03-03-16-0150906), from Walden University was obtained. Since this study used only de-identified archived data collected from the school district, there were no participants to protect. I will, however, explain the procedures I followed to maintain the confidentiality of the school district identifier and to protect the integrity of the archived data. The names of the schools were not used during or after the study was conducted. Instead, the single-gender school was designated *S1* and the coeducational school was designated *C1*. These designations were used in collecting data for analysis and in presenting the findings. All data retrieved from the school district were stored in a secure location in my home office and safeguarded by a password, on my personal computer. The data were permanently deleted from my personal computer 5 years following completion of the study.

Data Analysis Results

Some researchers have identified single-gender schools as having the potential to raise levels of academic achievement, but there is limited evidence of the overall efficacy of the model (Gurian et al., 2009; Rex & Chadwell, 2009; Sax, 2008; Williams, 2016). In this study, I sought to determine if there were significant differences in reading achievement among middle school boys in a coeducational middle school compared to a

single-gender school. Two middle schools from an urban school district were the setting for the study. The sample for this study consisted of male students (N = 386) in Grades 6, 7, and 8 who attended the two participating schools during 2011-2012, 2012-2013, and 2013-2014 school years. The students attended either the single-gender school (n = 256) or the coeducational school (n = 130).

The three research questions each address possible significant differences in reading achievement among middle school boys in a coeducational school compared to a single-gender school. The archival data collected from the local school district were transferred to an Excel spreadsheet and organized into de-identified sets (see Appendix B for an example of the data spreadsheet). Version 23 of the Statistical Package for Social Sciences (SPSS) was used to conduct the statistical analysis. Scale scores were used to communicate information about student performance levels. The student performance levels are: Level III: Advanced Academic Performance; Level II: Satisfactory Student Performance; and Level I: Unsatisfactory Academic Performance (TEA, 2012a). Table 2 illustrates the STAAR Scale Score Ranges and Performance Levels for each grade/subject area assessment used in this study.

Assumptions for One-Way ANOVA

For a one-way ANOVA test to be appropriate, six assumptions about the data must exist. According to Laerd (2017), verifying that a data set meets these assumptions is key to interpreting the validity of the results. However, it is common in "real-world data" for a data set to fail an assumption. In these instances, it is essential that

appropriate solutions be applied to overcome the violation of the assumption. The six assumptions for a one-way ANOVA are as follows:

1. The dependent variable must be continuous data, at the ratio or interval level.
2. The independent variable must be two or more categorical, independent groups.
3. There must be independence of observation—meaning, there is no relationship or overlap between the two groups.
4. There should be no significant outliers—data points that do not follow the usual pattern.
5. The dependent variable should be approximately normally distributed for each category of the independent variable.
6. The data set must have homogeneity of variances. (Laerd, 2017, Assumption, para. 2)

Assumptions 1-3. According to the first assumption, the dependent variable in this study must be interval or ratio data (Lodico et al., 2010; Spaulding, 2014). In this study, STAAR reading scale scores were used to compare the performance of students taking the same grade/subject area assessments. The two groups in this study, the independent variables, were students in the coeducational middle school or single-gender middle school—distinct locations creating independent groups without overlap in observation or membership. As these two groups are categorical and completely

independent, they meet the criteria for Assumptions 2 and 3 (Lodico et al., 2010; Spaulding, 2014).

Assumptions 4-5. In order to determine the presence of outliers and normal distribution in a data set, I reviewed the box-plots for the data sets and conducted a Shapiro-Wilk test (if n < 50) or Normal Q-Q Plot (if n > 50) review and calculated the skewness and kurtosis for each of the data sets in the independent variables.

When analyzing outliers with boxplots, according to Laerd (2017), "data points that are more than 1.5 box-lengths from the edge of their . . . box are classified by SPSS Statistics as outliers and are illustrated as circular dots" and "any data points that are more than 3 box-lengths away from the edge of their box are classified as extreme points (i.e. extreme outliers)" (Determining if your data has outliers, para. 2). The results for each of the independent variables is reported using this language and following this procedure.

The Shapiro-Wilk test of normality is an appropriate measure with samples sizes of less than 50. For samples greater than 50, the Normal Q-Q Plot is recommended (Laerd, 2017). In this study, the single-gender data sets of 102, 83, and 71 were evaluated with the Normal Q-Q Plot test. The coeducational data sets of 45, 44, and 41 were assessed with the Shapiro-Wilk test. In the Shapiro-Wilk test, if "data are normally distributed (i.e., the assumption of normality is met), the significance level . . . should be more than .05 (i.e., $p > .05$)." Conversely, if the data violate the assumption of normality, "the significance level will be less than .05 (i.e., $p < .05$)" (Laerd, 2017, *Shapiro-Wilk test*

of normality, para. 2). The process for determining and problem-solving outliers and the distribution of the data sets is organized by variable and research question.

RQ1: Sixth grade reading achievement. When analyzing the 147 data sets of sixth grade boys' reading achievement scores (S1 n = 102, C1 n = 45), I used the Explore: Plots tab in SPSS in order to create boxplots of the data set. For sixth grade reading achievement scores data, there was one outlier in the single-gender education group (i.e. Student 106) and three outliers in the coeducational group (i.e. Students 31 & 34 with the same score and Student 33), as assessed by inspection of a boxplot for values greater than 1.5 box-lengths from the edge of the box. None of these outliers were in the extreme outlier group of more than three box lengths from the edge.

When there are outliers present, best research practice requires an examination of the data set for (a) data entry errors, (b) measurement errors, or (c) genuinely unusual values (Laerd, 2017). Upon examination of this data set, there were no data entry or measurement errors; therefore, the outliers were determined to be genuinely unusual values. With unusual values in outliers, best research practice involves a process of determining if the outlier should be kept or removed from the data set.

There are different ways to resolve the problem of outliers. One can consider (a) using the non-parametric Kruskal-Wallis H test, (b) modifying the outliers, (c) transforming the data, or (d) including the outlier in the analysis anyway (Laerd, 2017). I chose to keep the outliers in the analysis. I calculated a one-way ANOVA with and without the outliers, compared the results, and found that the outliers had no effect on the

analysis. The results were essentially the same (e.g. no statistically significant difference).

Once the identified outliers were appropriately addressed, I evaluated the normality of the data set distribution. For the single-gender group, the Normal Q-Q Plot indicated a line approaching normality. A Shapiro-Wilk test, which can over identify deviations from normality with larger data sets, also indicated a normal distribution with reported $p = 0.660$. The indicated skewness of this distribution was 0.54 and kurtosis was 0.37. For the coeducational group, the Shapiro-Wilk test indicated the data set was not normally distributed with a $p = 0.013$ and skewness of 2.96 and kurtosis of 2.44.

There are also options for dealing with violations of normality that are similar to resolving outliers. One can (a) transform the data, (b) use a non-parametric test such as Kruskal-Wallis H test, (c) carry on regardless, or (d) test comparisons (Laerd, 2017). I reviewed the procedures for each method and selected the Kruskal-Wallis H test which does not assume normality in the data, is not highly sensitive to outliers, and there is no altering of the original data that might introduce bias in the analysis. I conducted a Kruskal-Wallis H test to determine differences in student achievement between school types as measured by the dependent variable, sixth grade reading test scores. I evaluated the difference in means for each of the data sets in the independent variables. An alpha level of .05 was used to determine significance and to make a decision about rejecting or failing to reject the null hypotheses (Creswell, 2015; Graham, 2016).

RQ2: Seventh grade reading achievement. When analyzing the 127 data sets of seventh grade boys' reading achievement scores (S1 $n = 83$, C1 $n = 44$), I used the

Explore: Plots tab in SPSS in order to create boxplots of the data set. For seventh grade reading achievement scores data, there was one outlier in the single-gender education group (i.e. Student 116) and no outliers in the coeducational group, as assessed by inspection of a boxplot for values greater than 1.5 box-lengths from the edge of the box. This outlier was not in the extreme outlier group of more than three box lengths from the edge.

When there are outliers present, best research practice requires an examination of the data set for (a) data entry errors, (b) measurement errors, or (c) genuinely unusual values (Laerd, 2017). Upon examination of this data set, there were no data entry or measurement errors; therefore, the outlier was determined to be a genuinely unusual value. With unusual values in outliers, best research practice involves a process of determining if the outlier should be kept or removed from the data set.

There are different ways to resolve the problem of outliers. One can consider (a) using the non-parametric Kruskal-Wallis H test, (b) modifying the outliers, (c) transforming the data, or (d) including the outlier in the analysis anyway (Laerd, 2017). I chose to keep the outlier in the analysis. I calculated a one-way ANOVA with and without the outlier, compared the results, and found that the outlier had no effect on the analysis. The results were essentially the same (e.g. no statistically significant difference).

Once the identified outlier was appropriately addressed, I evaluated the normality of the data set distribution. For the single-gender group, the Normal Q-Q Plot indicated a line approaching normality. A Shapiro-Wilk test, which can over identify deviations

from normality with larger data sets, indicated the data set was not normally distributed with reported $p = 0.008$. The indicated skewness of this distribution was -2.17 and kurtosis was 2.89. For the coeducational group, the Shapiro-Wilk test indicated a normal distribution with a $p = 0.089$ and skewness of 1.21 and kurtosis of -0.34.

The seventh grade test scores were normally distributed for the single-gender and coeducational groups, as assessed with the Normal Q-Q Plot or the Shapiro-Wilk's test. I calculated a one-way ANOVA to determine differences in student achievement between school types as measured by the dependent variable, seventh grade reading test scores. The mean difference of reading achievement between the single-gender group and the coeducational group was evaluated. An alpha level of .05 was used to determine significance and to make a decision about rejecting or failing to reject the null hypotheses (Creswell, 2015).

RQ3: Eighth grade reading achievement. When analyzing the 112 data sets of eighth grade boys' reading achievement scores (S1 $n = 71$, C1 $n = 41$), I used the Explore: Plots tab in SPSS in order to create boxplots of the data set. For eighth grade reading achievement scores data, there was two outliers in the single-gender education group (i.e. Students 63 & 114 with the same score) and one outlier in the coeducational group (i.e. Student 34 also the same score), as assessed by inspection of a boxplot for values greater than 1.5 box-lengths from the edge of the box. None of these outliers were in the extreme outlier group of more than three box lengths from the edge.

When there are outliers present, best research practice requires an examination of the data set for (a) data entry errors, (b) measurement errors, or (c) genuinely unusual

values (Laerd, 2017). Upon examination of this data set, there were no data entry or measurement errors; therefore, the outliers were determined to be genuinely unusual values. With unusual values in outliers, best research practice involves a process of determining if the outlier should be kept or removed from the data set.

There are different ways to resolve the problem of outliers. One can consider (a) using the non-parametric Kruskal-Wallis H test, (b) modifying the outliers, (c) transforming the data, or (d) including the outlier in the analysis anyway (Laerd, 2017). I chose to keep the outliers in the analysis. I calculated a one-way ANOVA with and without the outliers, compared the results, and found that the outliers had no effect on the analysis. The results were essentially the same (e.g. no statistically significant difference).

Once the identified outlier was appropriately addressed, I evaluated the normality of the data set distribution. For the single-gender group, the Normal Q-Q Plot indicated a line approaching normality. A Shapiro-Wilk test, which can over identify deviations from normality with larger data sets, indicated the data set was not normally distributed with reported $p = 0.003$. The indicated skewness of this distribution was 2.81 and kurtosis was 2.07. For the coeducational group, the Shapiro-Wilk test also indicated the data set was not normally distributed with a $p = 0.001$ and skewness of 3.53 and kurtosis of 3.43.

There are also options for dealing with violations of normality that are similar to resolving outliers. One can (a) transform the data, (b) use a non-parametric test such as Kruskal-Wallis H test, (c) carry on regardless, or (d) test comparisons (Laerd, 2017). I

reviewed the procedures for each method and selected the Kruskal-Wallis H test which does not assume normality in the data, is not highly sensitive to outliers, and there is no altering of the original data that might introduce bias in the analysis. I conducted a Kruskal-Wallis H test to determine differences in student achievement between school types as measured by the dependent variable, eighth grade reading test scores. I evaluated the difference in means for each of the data sets in the independent variables. An alpha level of .05 was used to determine significance and to make a decision about rejecting or failing to reject the null hypotheses (Creswell, 2015; Graham, 2016).

Assumptions 6. In order to determine whether the variances between the two groups for the dependent variable were equal, a test of homogeneity of variances must be generated (Lodico et al., 2010; Spaulding, 2014). If the sample size in each group is similar, violation of this assumption is not often too serious. However, if the sample sizes are quite different, the one-way ANOVA is sensitive to the violation of this assumption. In this study, sample sizes for the single-gender group and coeducational group were dissimilar.

I conducted a Levene's Test for Equality of Variances and interpreted the significance values for each of the data sets in the independent variables. If the significance value is more than .05 (i.e., $p > .05$), "the variances are equal (i.e., the assumption of homogeneity of variances is met)" (Laerd, 2017, *Assumption of homogeneity of variances,* para. 3). Conversely, if the significance value is less than .05 (i.e., $p < .05$), the variances are not equal and the assumption of homogeneity of variances

is violated (Laerd, 2017). The process for determining and problem-solving homogeneity of variances is organized by variable and research question.

RQ1: Sixth grade reading achievement. When analyzing the 147 data sets of sixth grade boys' reading achievement scores (S1 n = 102, C1 n = 45), I used the Oneway procedure in SPSS to generate the Levene's Test for Equality of Variances and the Welch ANOVA in case the assumption of homogeneity of variances is violated. For the sixth grade reading achievement scores data, the Levene's test indicated that there was homogeneity of variances with reported p = .279.

RQ2: Seventh grade reading achievement. When analyzing the 127 data sets of seventh grade boys' reading achievement scores (S1 n = 83, C1 n = 44), I used the Oneway procedure in SPSS to generate the Levene's Test for Equality of Variances and the Welch ANOVA in case the assumption of homogeneity of variances is violated. For the seventh grade reading achievement scores data, the Levene's test indicated that there was homogeneity of variances with reported p = .371.

RQ3: Eighth grade reading achievement. When analyzing the 112 data sets of eighth grade boys' reading achievement scores (S1 n = 71, C1 n = 41), I used the Oneway procedure in SPSS to generate the Levene's Test for Equality of Variances and the Welch ANOVA in case the assumption of homogeneity of variances is violated. For the eighth grade reading achievement scores data, the Levene's test indicated that there was homogeneity of variances with reported p = .255.

One-Way ANOVA and Kruskal-Wallis H Test

Based upon the assumptions for the one-way ANOVA and data sets for the three research questions in this study, I calculated a one-way ANOVA and Kruskal-Wallis H tests to determine differences in student achievement between school types as measured by the dependent variable, reading test scores. The mean difference of reading achievement between the single-gender school and the coeducational school was evaluated. An alpha level of .05 was used to determine significance and to make a decision about rejecting or failing to reject the null hypotheses (Creswell, 2015; Graham, 2016). Because effect size is necessary for interpreting statistical tests of significance (Cronk, 2017), the effect size was calculated using the SPSS measure partial eta squared (η^2). Cohen (1988) suggested effect sizes of .01 correspond to small, .09, moderate, and .25, large effects. The effect size examines the strength of the difference between two variables or two means. In this study, the effect sizes were not significant.

Assessment scores for two student groups were measured in this project study. The mean differences between the two populations regarding STAAR reading scale scores produced data points for comparison. I conducted a one-way ANOVA or a Kruskal-Wallis H test for each research question to compare reading test scores for students who were enrolled in Grades 6 through 8 during the 2011-2012, 2012-2013, and 2013-2014 school years at both the single-gender and coeducational school. Therefore, three separate statistical tests were conducted. The ANOVA test focused on reading scores in 7th grade and the Kruskal-Wallis H tests focused on reading scores in 6th and 8th grades. Table 3 shows the sample sizes for each statistical test.

Table 3

Sample Size of Analyzed Individual Scores by Year, Grade, and Subject (Reading [R]), and School Type (N = 386)

Year	Grade/Subject	S1	C1	Total
2011-2012	6 (R)	102	45	147
2012-2013	7 (R)	83	44	127
2013-2014	8 (R)	71	41	112
Total		256	130	386

Note. S1 = single-gender; C1 = coeducational

RQ1 Results

RQ1. Is there a significant difference in 6th grade reading achievement among middle school boys in a coeducational middle school compared to a single-gender middle school?

H_O1: There is no significant difference in 6th grade reading achievement among middle school boys in a coeducational middle school compared to a single-gender middle school.

H_A1: There is a significant difference in 6th grade reading achievement among middle school boys in a coeducational middle school compared to a single-gender middle school.

The reading achievement scaled-score means of male sixth grade students who attended the single-gender school (n = 102) and the coeducational school (n = 45) were compared using a Kruskal-Wallis H test. No significant difference was found, $\chi^2(1) =$

.096, $p = .757$. Sixth grade boys who attended the single-gender school had a mean score of 1663. Sixth grade boys who attended the coeducational school had a mean score of 1673. Therefore, the null hypothesis of no significant difference in 6th grade reading achievement among middle school boys in a single-gender middle school and a matched coeducational middle school could not be rejected.

RQ2 Results

RQ2. Is there a significant difference in 7th grade reading achievement among middle school boys in a coeducational middle school compared to a single-gender middle school?

H_O2: There is no significant difference in 7th grade reading achievement among middle school boys in a coeducational middle school compared to a single-gender middle school.

H_A2: There is a significant difference in 7th grade reading achievement among middle school boys in a coeducational middle school compared to a single-gender middle school.

The reading achievement scaled score means of 7th grade male students who attended the single-gender school ($n = 83$) and the coeducational school ($n = 44$) were compared using a one-way ANOVA. No significant difference was found, $F(1,125) = 3.01$, $p = .085$. Seventh grade boys who attended the single-gender school had a mean score of 1699 ($SD = 83.20$). Seventh grade boys who attended the coeducational school had a mean score of 1726 ($SD = 74.85$). Therefore, the null hypothesis of no significant

difference in 7th grade reading achievement among middle school boys in a single-gender middle school and a matched coeducational middle school could not be rejected.

RQ3 Results

RQ3. Is there a significant difference in 8th grade reading achievement among middle school boys in a coeducational middle school compared to a single-gender middle school?

H_O3: There is no significant difference in 8th grade reading achievement among middle school boys in a coeducational middle school compared to a single-gender middle school.

H_A3: There is a significant difference in 8th grade reading achievement among middle school boys in a coeducational middle school compared to a single-gender middle school.

The reading achievement scaled score means of students who attended the single-gender school ($n = 71$) and the coeducational school ($n = 41$) were compared using a Kruskal-Wallis H test. No significant difference was found, $\chi^2(1) = 1.467$, $p = .226$. Eighth grade boys who attended the single-gender school had a mean score of 1745. Eighth grade boys who attended the coeducational school had a mean score of 1768. Therefore, the null hypothesis of no significant difference in 8th grade reading achievement among middle school boys in a single-gender middle school and a matched coeducational middle school could not be rejected.

Summary of the Findings

The purpose of the study was to compare the two educational models to determine whether the single-gender model offered advantages over the coeducational model as measured by standardized reading test scores. As an overview of the findings of all three research questions, significance values for each year were greater than the significance level of .05 among the student groups. Therefore, differences in mean scores for STAAR reading achievement test scores, for middle school boys in a single-gender school (n = 256), were not significantly different from those attending a coeducational school (n = 130). According to the findings of this study, the results of the statistical analysis did not support the hypothesis that the single-gender model had a differential effect on reading test scores for middle school boys. Therefore, the null hypotheses could not be rejected.

The TEA measures district and campus performance based on the percentage of assessment results that meet or exceed the STAAR Level II Satisfactory Standard (Table 2). Campuses are expected to meet specific targets to show acceptable performance across all subjects for all students (TEA, 2012b). The STAAR measures individual student performance of the statewide content standards identified through the writing, reading, mathematics, science, social studies assessments (TEA, 2012c). The TEA (2012b) sets cut scores regarding the number of items answered correctly (raw scores) and those that determine student performance levels (scale scores). The analysis of STAAR reading scale scores during the 3-year period indicated that the mean performance levels for study participants were at satisfactory levels for each year tested (Table 2).

The 2007-2011 performance data by gender showed middle school girls consistently outperformed middle school boys on state assessments of reading (TEA, 2011b). To address this problem of low reading achievement experienced by middle school boys, the district established a single-gender school in August 2011. According to the 2011-2014 district performance data, middle school girls continued to score higher on state reading assessments than middle school boys (TEA, 2013a; 2014). Compared to the 2007-2011 performance data by gender, the differences in reading indicated a steady pattern in lower reading achievement for boys than girls.

In this study, I sought to determine if there were significant differences in reading achievement among middle school boys in a coeducational middle school compared to a single-gender school. Based on the findings of the study, there was no statistically significant difference in the mean scores among students attending the single-gender school and the coeducational school, which indicated that the single-gender model did not have a differential effect on increasing middle school boys' reading test scores. Therefore, a solution to address reading achievement among middle school boys in the local district was still needed.

I conducted further research of ways to enhance student learning and reading proficiency on the STAAR assessments, resulting in the proposal of a continuous improvement model as a potential solution to address reading achievement among middle school boys in both single-gender and coeducational schools. To improve student performance, stakeholders must first analyze existing school practices and interventions to determine what is and is not working to meet the needs of students being served,

versus adding additional practices or interventions (Bernhardt, 2013). Additionally, stakeholders must implement protocols for gathering and analyzing data to monitor and adjust school programs and processes to ensure learning for every student (Bernhardt, 2013). The continuous school improvement model employs data-driven decision making and collaboration among teachers to revitalize instruction and assessment strategies in both single-gender and coeducational schools to maximize reading achievement and learning outcomes.

The decision to focus the project of this study on a continuous improvement model coincides with the theoretical basis of the study outlined in section one. The theoretical frameworks for the study centers around multiple intelligences and brain-based learning perspectives where educators focus on the unique qualities of each learner and how students learn. Each of these theories offers a comprehensive approach to learning and teaching. Proponents of multiple intelligences and brain-based learning demonstrate that accommodating the students' individual intelligences and learning strengths result in more effective learning. The project for this study draws from both theories by providing schools with a structured cycle of analyzing assessment data to create instructional plans and practices to meet the individual needs of each student, thus resulting in improved teaching skills for every teacher and learning skills for every student.

Consistencies and Inconsistencies with Findings in the Literature

I compared two educational models to determine whether the single-gender model offered advantages over the coeducational model as measured by standardized reading

test scores. The results of this study revealed that reading test scores, for middle school boys in a single-gender school, were not significantly different from those attending a coeducational school. These results do not correspond with some educational researchers that single-gender education has the potential to elevate academic achievement (Gurian et al., 2009; Rex & Chadwell, 2009; Sax, 2008). However, these results do correspond with a systematic review conducted by the RMC Research Corporation that there is no causal evidence that suggests that single-gender schools significantly improve the quality of academic achievement (Riordan et al., 2008; Williams, 2016). Also, these findings correspond with research that single-gender is neither beneficial or harmful (Corbett, Hill, & St. Rose, 2008; Signorella et al., 2013; Singh et al., 1998).

It should be noted that due to the scarcity of recent research on similar populations of students and grade levels, comparisons were made between the findings with current literature focused on populations of dissimilar grade levels. Whether single-gender education has any influence on academic achievement remains hotly contested. The findings of this study do not reflect significant differences for middle school males on academic achievement in reading. Other researchers have reported the lack of support for single-gender education, specifically for males.

In their investigation, Else-Quest and Peterca (2015) compared 11th-grade boys and girls from urban public single-sex and mixed-sex schools. There was some evidence that the single-sex environment was associated with higher standardized test scores among girls, but not boys. That is, while girls in the single-sex school outperformed girls in the mixed-sex school in subjects of math, science, reading, and writing, boys in the

single-sex school scored lower than boys in the mixed-sex school on the state tests of reading and math. It was also reported that girls and boys were more likely to thrive in a coeducational environment. Their findings closely parallel those of Dwarte (2014). The purpose of Dwarte's (2014) study was to evaluate the extent the restructuring of an urban middle school into a single-sex school influenced reading achievement for African American students. For males, findings revealed no evidence of improved reading achievement as a result of the restructuring. However, for females, the findings proved significant for the single-sex school structure. Other researchers investigating the influence of single-gender education have reported similar results for non-significance for male students (Blake, 2012; English, 2014; Houston, 2011; Ragland, 2011; Sago, 2011).

Other researchers have published findings that are inconsistent with this researcher's findings. For example, Heins, MacIsaac, Piechura-Couture, and Tichenor (2012) studied the effects of single-gender classes on writing achievement in a public elementary school. The results of a 3-year study showed a significant difference in the levels of achievement for boys and girls in single-gender classes. In another study, Button (2012) researched performance scores for ninth grade males attending a public high school and found that students in single-gender classes showed significantly higher reading achievement scores compared to students in coeducational classrooms. Hodges (2011) analyzed the influence of single-gender grouping on the reading performance of fourth grade students and found significant differences in the mean reading performance level scores between the fourth grade male students in single-gender and mixed-gender classes.

Interpretation of Results

The purpose of this quantitative study was to compare the two educational models to determine whether the single-gender model offered advantages over the coeducational model as measured by standardized reading test scores. To complete this study, I analyzed reading test scores of boys ($N = 386$) enrolled in two public middle schools in Texas. The data set included reading test scores for male students in Grade 6 (2011-2013), Grade 7 (2012-2013), and Grade 8 (2013-2014) at both the single-gender and coeducational schools.

In Texas, the education agency assigns each campus to a unique comparison group within the same campus type (i.e., elementary, middle, high school) that closely matches that school on six demographic characteristics. The characteristics are ethnic distribution (i.e., African American, Hispanic, White), the percentage of English language learners (ELL), the percentage of students who are economically disadvantaged (ED), and mobility rate. The same characteristics were used in this study to determine comparison campus. Comparison groups are useful in that schools can compare their performance to schools that are demographically similar. This study controlled for extraneous variables by selecting a coeducational campus that most closely matched the single-gender school on the demographic characteristics. After data analysis, no significant difference in reading achievement was found among boys in Grades 6, 7, and 8 in a single-gender middle school compared with a coeducational middle school.

The three statistical tests conducted showed that no significant differences were found in the STAAR reading scores. Descriptive findings showed that reading

achievement for all three years of the analysis were slightly higher in the coeducational setting than in the single-gender setting. The differences ranged from 10 to 27 points. Seventh grade reading experienced the highest difference. Although a number of confounding variables may have played a significant role in these respective outcomes (e.g., mobility rate; student ability level; teacher quality; the instructional schedule), it is reasonable to suggest that the single-gender school did not have a significant influence on the reading performance of middle school boys.

Summary

Male students in middle school today are having difficulty with reading, especially when compared to girls, who exhibit higher reading achievement. The quantitative data from this study point to the conclusion that single-gender education is not better compared to coeducation in male reading achievement, although it is not detrimental either. With the increase in public single-gender schools for boys, additional investigation and research into the educational model is necessary before a conclusion can be drawn about its effectiveness.

Section 3: The Project

In this project study, I addressed the lack of evidence on the efficacy of the single-gender educational model as compared to the coeducational model in increasing reading achievement for boys attending middle school in the local school district. Leaders in the local district implemented the single-gender model to address the problem of an ongoing reading achievement gap among middle school boys and girls. The 2007-2011 performance data in the local school district showed that girls scored higher than boys on state reading assessments (TEA, 2011b). In an effort to reduce the reading achievement discrepancy among middle school girls and boys and expand opportunities for boys, in August 2011, the school district opened its first single-gender school for boys in Grades 6 through 9. Although the school had been operational for multiple school years, it was not known to what extent the public single-gender educational model was effective in addressing the problem of reading underachievement.

I compared the two educational models by measuring standardized test scores in reading to determine whether the single-gender model offered advantages over the coeducational model. Based on the study's findings, there was not a statistically significant difference in mean scores among students attending the two educational settings. Therefore, the data did not support the hypothesis that the single-gender model had a differential effect on reading test scores for middle school boys. As a result, an alternative solution was needed to address the problem of low reading achievement among middle school boys in the local district.

Based on the findings of this study, I proposed a continuous improvement model as an alternative solution to address the problem of low reading achievement among middle school boys. Continuous school improvement is intended to improve efficiency, effectiveness, and student outcomes (Best & Dunlap, 2014). Stakeholders first analyze existing school practices and interventions to determine what is and is not working to meet the needs of students, versus adding additional practices or interventions (Bernhardt, 2013). Additionally, stakeholders implement protocols for gathering and analyzing data to monitor and adjust school programs and processes to ensure learning for every student (Bernhardt, 2013).

For my project, I chose to produce a white paper with recommendations for implementing a continuous school improvement model in middle schools within the district. This section includes the description and goals and rationale for the white paper, along with a review of supporting literature and an overview of the implementation and project evaluation plans. I also discuss the implications for social change resulting from the recommended project.

Description and Goals

Through the white paper, I present the findings of a comparison of STAAR reading assessment scores among school types (single-gender and coeducational) and provide steps for implementing a continuous improvement model in middle schools within the district (see Appendix A). The intent of this study was to determine the effectiveness of the single-gender model as a solution to the problem of low reading achievement among middle school boys. The results of the data analysis did not show a

difference in reading scores among male students and, thus, did not support the continuation of the single-gender model as a solution to the problem. As discussed in the white paper, a continuous school improvement model may provide a means for educators in the district to effectively address the study problem. Steele (2013) noted that a continuous school improvement model may be beneficial for improving reading achievement in all subjects and grade levels. The white paper is appropriate for reporting this study's findings and recommending the continuous school improvement model because of its short, clear, and concise reporting format. The white paper may better benefit stakeholders over other methods of conveying information.

The first goal of this project is to recommend the concept of continuous school improvement as a potential solution to address the practice problem and increase student performance on STAAR assessments. The second goal of this project is to recommend an action plan to facilitate the process of implementing continuous school improvement in the district's middle schools. The white paper includes an introduction, a discussion of the problem, the findings, recommendations, a conclusion, and references.

Rationale

The purpose of the causal-comparative study which led to the white paper project was to compare the two educational models to determine whether the single-gender model offered advantages over the coeducational model as measured by standardized reading test scores. The setting for the study was two middle schools from an urban school district in northern Texas. Using archival data, I compared reading test scores for male students enrolled in Grades 6 through 8 during the 2011-2012, 2012-2013, and

2013-2014 school years. Results of the statistical analysis conducted on STAAR reading assessments from the 2011-2012, 2012-2013, and 2013-2014 school years revealed no statistically significant difference for any year tested between students enrolled at the single-gender campus and students enrolled at the coeducational campus. Therefore, the findings do not support the continuation of the single-gender model as a solution to the problem of low reading achievement. After reviewing the findings, I searched the professional literature for an alternative recommendation to increase reading achievement among middle school boys in the local district. My search led me to the concept of continuous school improvement, specifically the 8-step continuous improvement model.

White papers address major problems and issues by using data to provide a synopsis of research studies (Sachiko, Stolley, & Hyde, 2015). The intention of this project is to provide school- and district-level administrators with a framework for implementing the 8-step continuous improvement process, through which teachers engage in data-driven decision making and collaboration to improve academic achievement among students (Davenport & Hinckley, 2012). The process is grounded in Effective Schools Research, Total Quality Management (TQM) principles, and the Deming Cycle of Plan-Do-Check-Act (PDCA; Davenport & Hinckley, 2012; Schilawski, 2016).

Through comprehensive use of data, implementation of the model could potentially result in improved teaching skills for every teacher and learning skills for every student. According to Bernhardt (2013), continuous school improvement plans based on multiple measures of data have the potential to move an entire school system

forward more efficiently and effectively. Assessments play an important role in how students learn, their motivation to learn, and how teachers teach (Bernhardt, 2013). The continuous improvement process allows schools to use formative assessments to measure what students know, decide what educators teach, and determine which students need extra help on identified skills and concepts (Ainsworth & Viegut, 2015; Bernhardt, 2013).

Review of the Literature

The literature review starts with a discussion of the purpose, format, and content of a white paper followed by an overview of important considerations to improve student achievement and teacher efficacy. The modules are the continuous school improvement process, including processes and strategies; the role of data collection and analysis; the 8-step continuous improvement model; and research from schools that have implemented the model. I conducted an online search of the Walden Library using the following key words: *white paper*, *grey literature*, *continuous school improvement models*, *increasing student proficiency*, *data analysis*, *data models*, *assessments*, *PDCA*, *multiple measures of data*, and *8-step continuous improvement process.* To perform this search, I used Education Research Complete, Education Source, ERIC, Google Scholar, ProQuest Central, and SAGE Premier databases. Additional resources were located from references cited in studies published in peer-reviewed journals, papers presented at research symposiums, and unpublished dissertations.

White Paper

The term *white paper* originated in the British government as a means to describe an extensive written statement of government policy (Canright, 2013). The United States adopted the term whitepaper and defined it as a report too short for binding as a blue book (Canright, 2013). The intention of a white paper is to present recommendations to create change (Click, 2011). Historically, the business sector used white papers as a tool to attract new customers and increase sales to existing customers (Canright, 2013). The white paper has become an effective means to advise school and district administrators, teachers, and community stakeholders of problems in the educational sphere and their possible solutions (Hoffman, 2013).

White papers are most often used as a professional tool to convey information to the targeted audience. A white paper is presented in an easy to read format, which appeals to many readers (Sachiko et al., 2015). White papers advocate a position as the best solution for a particular problem, present an argument, report results, and give the reader valuable information to make informed decisions (Canright, 2013).

White papers include introduction/summary, background/problems, proposed solution, conclusion, and references (Canright, 2013; Sachiko et al., 2015). The intention of the white paper's introduction is to provide a summary allowing the reader to grasp the purpose of the white paper (Sachiko et al., 2015). White papers include general background information related to a problem or issue allowing the reader to make decisions based on the understanding of facts (Sachiko et al., 2015). The white paper's

conclusion is intended to improve the reader's understanding of the link between the problem and recommendations.

Concept of Continuous School Improvement

Continuous school improvement refers to a district, school, or other organization's ongoing commitment to improving that organization's operations and deliverables. These improvement strategies are based on objective research data. The processes incorporate these strategies into the daily work of individuals and the larger system and are repeatable under varying circumstances (Park, Hironaka, Carver, & Nordstrum, (2013). In the classroom, continuous school improvement uses timely, accurate data to guide and improve instruction. Continuous school improvement will improve efficiency, effectiveness, and student outcomes (Best & Dunlap, 2014). By systematically testing potential solutions against specific, measurable goals, the continuous school improvement approach narrows the focus on solutions to problems (Bernhardt & Herbert, 2011; Buckner, 2013). Continuous school improvement is built on the belief that improvement cannot be achieved intermittently but requires ongoing dedication to a process of learning, self-reflection, adaptation, and growth (Hidden Curriculum, 2014). Continuous school improvement involves a cyclical approach to problem solving. The approach allows stakeholders to (Flumerfelt & Green, 2013):

- reflect on their work,
- identify problem areas,
- pilot potential solutions to those problems,

- observe and evaluate interventions, and
- adapt interventions based on data collected.

One model of continuous school improvement is the Deming wheel or Deming cycle which has been used to improve student learning in several schools and districts (Hinckley, 2012; Schilawski, 2016). The Deming Cycle of Plan-Do-Check-Act is also known as PDCA. The PDCA cycle is a systematic method for gaining valuable learning and knowledge for the continual improvement of a process (Bernhardt, 2013; Deming, 2015). The PDCA cycle includes four stages (Beitsch, Carretta, McKeever, Pattnaik, & Gillen, 2013; Bernhardt, 2013):

- Plan: A continuous improvement team studies an identified problem, collects baseline data on that problem, details potential solutions to that problem, and develops an action plan.
- Do: The team implements its action plan, collects data on its intervention, and records outcomes.
- Check: The team compares baseline and new data, analyzes results, and documents lessons learned.
- Act: Depending on the success of the program, the team determines whether to adopt, modify, or abandon its tested solution.

Educational organizations that have implemented continuous school improvement plans have experienced positive results, including decreased failure rates, an improvement in Advanced Placement success levels, and more efficient budgeting; as well as increased

homework completion rates, kindergarten readiness, and college enrollments (Flumerfelt & Green, 2013; Park et al., 2013).

Role of Data in Continuous School Improvement

Successful continuous school improvement requires that the responsible team take a long-term, far-reaching look at a school's status by examining data measuring school processes as well as student achievement and attitudinal data to ensure learning growth for every student. Schools need to rethink current structures as to making minor changes to existing strategies and interventions (Bernhardt, 2013). To accomplish this task, continuous school improvement utilizes various methodologies to gather, analyze and report a range of indicators of student learning gathered at multiple points in time, within and across subject areas (Bernhardt, 2013). To ensure improved teaching throughout a system, teams of principals, teachers, and other professional staff meet and collaborate in an iterative cycle of improvement (Riches, 2016; Slabine, 2011). Continuous school improvement is based on a comprehensive assessment of student, teacher, and school learning needs. Teams use data to specify student learning needs and research best practices to identify effective classroom strategies: examining student work, performing action research, and developing formative assessments (Slabine, 2011, p. 1).

Multiple measures of data. Multiple sources of data offer a more balanced and inclusive analysis of student, educator, and system performance than any single types or sources of data can provide (Riches, 2016; Slabine, 2011). Multiple measures of data fall into four categories: demographic, perceptions, student learning, and school processes (Bernhardt, 2013)**.** Demographical data such as student enrollment, age, gender,

ethnicity, and special needs populations, can be used to predict trends in the student population to allow school personnel to anticipate and plan proactively for upcoming changes in educational needs (Bernhardt, 2013).

Perception data are important to continuous school improvement because perceptions set the tone of the school climate (Bernhardt, 2013). School climate is the shared attitudes, beliefs, and values that affect interpersonal relationships among students, teachers, and administrators that influence students' achievement (Childs, Kincaid, George, & Gage, 2016). Student perceptions can provide information that is often not accurately observed in formal classroom visits by principals or evaluators, and students have viewpoints that can benefit the school improvement process (Barge, 2013). Teachers should use student perception data as a tool in continuously improving and setting learning goals for themselves and their instructional practice (Barge, 2013). Other forums, including interviews, focus groups, questionnaires, and self-assessments that involve stakeholders, can provide useful information. These diverse approaches add important data that assist in understanding perceptions.

Student learning data, including grade point averages, standards assessments, standardized tests results, and authentic assessments, represent the most commonly used data source in schools (Bernhardt, 2013). Continuous school improvement requires a synthesis of this data, disaggregated by student demographic groups, by teachers, by grade levels. This research is longitudinal and is accomplished by following the same groups of students (cohorts) over time (Bernhardt, 2013). Collective as well as individual student data identifies those students proficient in essential skills and those requiring

improvement. Analyzing student learning data across grade levels confirms a school's instructional coherence, and whether it has aligned curriculum, instruction, and assessment within and across grade levels (Bernhardt, 2013).

Assessments are the most commonly used forms of student learning data (Ainsworth & Viegut, 2015; Bernhardt, 2013). Assessments are used as measurements *of* and *for* learning. A measurement of learning, or summative assessment such as the STAAR test administered in the state of Texas, is used to assess learning after instruction has occurred, and support letter grades, and/or levels of proficiency (Ainsworth & Viegut, 2015). A measurement for learning, or formative assessment, "is an ongoing process in which classroom teachers assess students' knowledge and understanding with activity-embedded, brief, small-scale tasks that are linked directly to the current curriculum topic" (Ainsworth & Viegut, 2015, p. 6).

Assessments for learning help "teachers gain insight into what students understand to plan and guide instruction, and provide helpful feedback" to students (Bernhardt, 2013, p. 54). Formative assessment results are intended to: accurately interpret student learning needs, set individual classroom goals as well as grade- and course-level team goals for student improvement, identify and share effective teaching strategies to accomplish goals, plan ways to differentiate instruction and correct student perceptions, and inform students about their current progress so teachers can adjust their learning methods and strategies (Ainsworth & Viegut, 2015).

School process data allow schools and school systems to look beyond performance data to analyze school processes that may be contributing to the state of the

school's performance data (AdvancED, 2011; Childs & Russell, 2017). School processes include methods and intervention actions administrators take regarding the curriculum, instruction, and assessment strategies (Bernhardt, 2013). Understanding a school's processes is the first step in clarifying how a school is achieving its goals and getting its results. School process data tell about the way the school works, indicates how results are being obtained, and indicates what is working and what is not working in the school (Bernhardt, 2013). School processes are the only measures over which a school has complete control in an education setting. For a school to see changed scholastic results, the school must be willing to change its processes. For the school to make changes, there must be a buy-in on the part of its stakeholders. School staff must agree that change is necessary to determine the processes to be altered or abandoned to achieve agreed-to desired outcomes (Bernhardt, 2013).

Shared vision. Continuous school improvement requires schools to focus on a shift from compliance to a commitment by implementing a shared vision in a manner that will lead to improved teaching and ultimately increased learning for all students (Bernhardt, 2013). The school's vision, goals, and student expectations must reflect the core values and beliefs of the staff, merged from personal values and beliefs. After analyzing multiple measures of data and determining what is and is not working and why, school staff members need to study and discuss the implications of teaching current and future student populations. Additionally, staff members need to identify changes needed in the school's curriculum, instruction, assessment, and environmental approaches to

implementing best practices, and then create a vision for where they want to go (Bernhardt, 2013).

The 8-Step Continuous Improvement Process

An approach to implementing continuous school improvement called the 8-step continuous improvement process, could be effective in single-gender and coeducational schools. This process was created to provide educators with a significant tool in providing the structure and accountability needed for schools and school districts to close achievement gaps as measured by standardized test scores (Garcia, 2012; Hinckley, 2012; Schilawski, 2016). Reform efforts in Brazosport, Texas led to the development of the 8-step process. In 1991-1992, after the realization that students in low-income areas of Brazosport Independent School District (BISD) routinely failed standardized tests in which students in more affluent areas of the district routinely passed, the district began to seek a solution to close the achievement gaps (Graham, 2016). The district began to analyze data on teachers experiencing the most success with economically disadvantaged students. The results led to the school-wide, and eventually district-wide, implementation of an 8-step process. By 1998–1999, BISD had received national accolades from public and private organizations for showing impressive gains resulting in 91% of students in all demographic groups achieving passing scores in reading, math, and writing (Anderson, 2012). Several districts employed the model in the late 1990s and early 2000s. More recently, there has been recurring interest in the instructional model at both the small school district level as well as a large urban district initiative, such as the one in this study (Edwards, 2015).

BISD embedded the 8-step process (Table 4) into the four parts of the PDCA instructional cycle (Edwards, 2015; Garcia, 2012).

Table 4

PDCA and 8-Step Continuous Improvement Process

Plan	Do	Check	Act
1: Data Disaggregation	3: Instructional Focus	4: Assessment	5: Tutorials
2: Instructional Calendars		7: Maintenance	6: Enrichment
		8: Monitoring	

Note. The 8-Step Process for Continuous Improvement is from Davenport and Hinckley (2012).

As shown in Table 4, the model consists of an 8-step process that is a data-driven, cyclical continuous improvement approach and is appropriate for the problem addressed in this study. The steps include (1) data disaggregation, (2) development of instructional calendar, (3) instructional focus supported by research-based effective practices, (4) frequent assessments, (5) tutorials, (6) enrichment, (7) maintenance, and (8) process monitoring (Davenport & Hinckley, 2012).

Step 1: Data disaggregation. Using data in the classroom is essential for reading instruction, but allotting time for teachers to learn from each other is equally important. Collaboration is a vital in the implementation of data-driven practices, such as discussing problems surrounding student-learning or working together to find possible instructional strategies to remediate these concerns. The best way to collaborate is to identify a team

and set expectations by establishing structured collaborative meeting times and adopting a systematic process for data analysis to improve teachers' ability to meet students' individual needs (Jackson, 2013).

Principals and teachers learn to analyze STAAR data to identify reading standards, objectives, and skills that require improvement. At the beginning of each school year, summative assessment data are disaggregated by school, grade level, teacher, student, and student subgroups—ethnicity, gender, special education, ED, and ELL. This step is to determine which students' needs are met and which are not. The data are used to also determine areas of the curriculum that students perform well in and to target areas where more instruction is needed. Data are ranked by mastered skills from weakest to strongest, resulting in specific instructional goals for closing the reading achievement gap for middle school boys in the local school district. An analysis to identify which teachers are successful with which standards, as well as other factors that could potentially influence test results such as attendance, grade distribution, dropout rates, and behavior issues, are explored (J. V. Brown, 2013).

Data disaggregation in the 8-step process requires quality team planning (Graham, 2016). Grade-level/ELA teachers meet on a weekly basis to discuss data from ongoing student assessments, collaboratively plan and share best practices for teaching reading standards, objectives, and skills. During this time, teachers identify mastered and non-mastered objectives by analyzing individual test items that require improvement, and identify which students learned each skill (e.g. make inferences, draw conclusions, summarize) and which students did not. Students having trouble are given extra time and

support to ensure their learning. Teachers also place skills in which students scored the lowest as high priority (Graham, 2016).

Data walls are used throughout the school year to provide visual displays of student progress on various assessments. *Data walls* include a color-coding system used by each teacher to indicate the level of performance for every student. Data is given a face by having every student represented on the teacher work room data walls. Students' levels of achievement are color-coded: students who are performing well above expected levels are *blue*; students who are on-track are *green; yellow* is used for students just below standard and need assistance; and *red* reflects students who have not mastered standards and need intensive support (Benson, 2014; Davenport & Anderson, 2011). "Data walls are updated after each formative and summative assessment" to assist teachers in identifying students in need of intervention (Davenport & Hinckley, 2012, p. 4).

Step 2: Instructional calendars. Step 2 of the 8-step process involves the creation of an instructional calendar, which is reviewed and modified annually based on data analyses of assessment results from the previous year. The instructional calendar outlines the sequence of instruction for addressing the objectives under specific reading standards identified in Step 1 to be the greatest need for students. The instructional calendar divides each grading period into weekly blocks showing which skills will be taught and when formative and summative assessments will be administered. In this process, teachers can look down the road and provide the necessary supports in building upon student's knowledge and skills. As part of the 8-step process, instructional

calendars are displayed in classrooms, in common areas, and on the school website. The instructional calendars are made available to all teachers, students, parents and community members (J. V. Brown, 2013; Garcia, 2012; Graham, 2016).

Step 3: Instructional focus. The key to instructional focus is the success of students. The goal is quality instruction and student mastery. The instructional calendar guides the instructional focus within the 8-step process. Research-based best practices are reliant upon effective instruction to individuals, small groups or the whole class driven by the intersection of the instructional calendar and data results (Davenport & Hinckley, 2012). Teacher mentoring and support is provided to support the collaborative planning, continuous professional development opportunities, instructional focus, and sharing of best practices. Additionally, classroom walkthroughs are routinely conducted to ensure that teachers are addressing reading content and skills prioritized by the instructional calendar, employing effective strategies, and addressing needs identified through the analysis of formative assessment results (J. V. Brown, 2013; Davenport & Anderson, 2011; Davenport & Hinckley, 2012; Garcia, 2012; Graham, 2016).

Step 4: Assessment. Accountability reforms for student learning have created an increased emphasis on the belief that assessments can be an important lever for improved teaching and learning (Aristizabal, 2016). Regular use of assessment data provides educators with the ability to (Aristizabal, 2016):

- Better understand the academic needs of students, and respond to these needs by targeting instruction, support, and resources accordingly

- Better understand the instructional strengths and weaknesses of individual teachers, and use this information to focus professional development, peer support, and improvement efforts
- Support and facilitate conversations among teachers and instructional leaders regarding strategies for improving instruction.

Within the 8-step process, formative assessments are administered monthly to inform progress throughout the year. These formative assessments are intended to: check for student understanding, tell which students are learning and which need more help, chart student progress, adjust teaching methods to achieve better results, and modify the instructional calendar as needed for re-teaching or acceleration (Davenport & Hinckley, 2012). After each formative assessment, school administrators and teachers engage in half-day data meetings, to analyze data results. Teachers complete learning logs, which detail classroom formative assessment results by skill to examine outcomes, aggregate and disaggregate results, discuss what's working, and to determine where more effort is needed (J. V. Brown, 2013; Davenport & Anderson, 2011; Garcia, 2012; Graham, 2016; Schmoker, 1999). Schools that analyze and review data several times per month are more successful in decreasing the academic achievement gap than schools that only review data several times throughout the year (Lezotte & Snyder, 2011).

Steps 5 and 6: Tutorials and enrichment. *Data meetings* are used to assist ELA teachers in determining next steps of intervention for students who have not mastered reading standards, as well as determining enrichment for students demonstrating initial mastery. A school-wide 30-minute period is utilized to provide such intervention or

enrichment based on formative assessment results. Middle school boys needing intervention are assigned to ELA teachers in small groups. Those receiving enrichment are assigned to non-content area teachers. During this time, tutorials, games, manipulatives, graphic organizers, and technology are used to help students who did not master assessed skills. Students are re-assessed after concepts are re-taught, and those who master the skills participate in enrichment activities that provide intellectual challenges (Davenport & Anderson, 2011; Garcia, 2012; Graham, 2016).

Step 7: Maintenance. The 8-step process tends that maintenance is key to any long-range strategy to improve schools, and it is an especially powerful tool for at-risk students, such as middle school boys (Davenport & Hinckley, 2012). Maintenance helps to reinforce knowledge and skills previously taught. Review and maintenance of learned material begin immediately after the introduction of a new idea and continues throughout the school year (Davenport & Hinckley, 2012). Students maintain skills learned through a cyclical and periodic review of skills taught during class starters, daily oral language, and learning software. Additionally, formative assessments include skills previously taught and tested to ensure students are retaining their understanding of previously taught concepts and skills (Benson, 2014; Davenport & Anderson, 2011; Downey, Steffy, Poston, & English, 2009).

Step 8: Monitoring. Ongoing monitoring of the 8-step process is conducted through process checks. Process checks are performed to help guide the school/district on its road to continuous improvement. During process checks, issues are discussed, and solutions are generated through the development of an action plan. The principal holds

the responsibility of monitoring the 8-step process at every step. The 8-step process requires the principal to (Edwards, 2015; Garcia, 2012):

- Conduct classroom walkthroughs on a regular basis
- Hold one-on-one student conferences
- Conduct monthly data meetings with grade-level/content area teachers
- Monitor grade-level/department-level team planning meetings
- Ensure that data walls are continuously updated
- Oversee implementation of the 30-minute period
- Celebrate success with teachers, students, and parents.

Research Supporting the 8-Step Process

In addition to the BISD, the 8-step process has been implemented in several schools and districts resulting in increases in standardized test scores (Anderson, 2012; Edwards, 2015; Steele, 2013). In 2002, the Metropolitan School District of Warren Township located in Indiana, a K-12 urban district, began to pilot the 8-step process in its lowest performing schools. From 2002- 2009, all schools in which the 8-step process cycle had been implemented experienced significant gains in ELA and math ranging from 9.6% to 35.3%, exceeding Indiana's growth rate each year. Due to the significant gains experienced in pilot schools from 2002-2009, the Indiana Department of Education implemented the 8-step process into 26 other low-performing elementary and middle schools (Davenport & Hinckley, 2012; Schilawski, 2016). Within 1 year of implementation 17 of 26 schools increased ELA and math proficiency on standardized ELA and Math assessments.

In order to measure the significance of the 8-step process for improving reading achievement scores for Spanish-speaking English Language Learner (ELL) students in the school, a 2012 study in an elementary school in a southern Arizona school district was conducted (Edwards, 2015; Garcia, 2012). The Arizona Instrument to Measure Standards (AIMS) reading achievement scores for third-grade ELL students during the 2009-2010 school year and fourth-grade ELL students during the 2010-2011 school year were assessed using a dependent samples *t* test to measure whether there was a significant difference in reading achievement after implementation of the 8-step process. Additionally, the researcher considered the difference in the reading performance categories on AIMS following implementation of the process for non-ELL students and ELL students. The AIMS categories consisted of Falls Far Below, Approaches, Meets, and Exceeds. The non-ELL cohort improved categories 23.3% when comparing the 2009-10 AIMS categories to the 2010-11 categories. The ELL cohort improved categories 58.3% when comparing the 2009-10 AIMS categories to the 2010-11 categories, showing significant differences between the increase in performance categories between the non-ELL and ELL cohorts at the $p = .015$ level of significance (Edwards, 2015; Garcia, 2012). Limitations of this study included a small sample cohort of ELL students within one elementary school and the reduction of the sample due to the high attrition rate of the third- and fourth-grade ELL cohorts over the 2-year period (Edwards, 2015; Garcia, 2012). While the results indicated significant gains for the fourth-grade cohort for both ELL and non-ELL students, the researcher suggested extending the study to include a larger sample size within the researcher's district as well

as repeating the study with a sample group that consisted of different demographics (Edwards, 2015; Garcia, 2012).

Steele (2013) analyzed Tennessee Comprehensive Assessment Program (TCAP) scores on reading to determine if the 8-step process provided a framework to raise reading achievement among students and focus educators in identifying high yield strategies. Quantitative data were collected on the ELA TCAP assessments for the 2010-2011 and 2011-2012 school years. The results showed practical and significant differences in student growth as expressed by Tennessee Value-Added Assessment System (TVAAS) score. Furthermore, effect sizes were above minimum recommended values for schools that partially and fully implemented the 8-step process versus schools that did not implement the process.

Implementation of the 8-step process as a commitment to increase student achievement is viewed nationally as a significant tool in providing the structure and accountability required of schools and districts (Davenport & Hinckley, 2012; Schilawski, 2016). As schools and districts embark on implementing the 8-step process, organizations must commit to providing the time, culture, and resources for every child to be successful (Anderson, 2012). The 8-step process is intended to be a process of education reform, with the belief that all students can learn, given the proper resources and time (Anderson, 2012).

A common factor in implementing the 8-step process has been for districts and schools to contract external consultant companies or individuals to lead and monitor the process (Park et al., 2013). An external school improvement consultant provides

objective and expert guidance to carry out the process of school reform (David, 2014). The process of identifying and selecting an external contractor and then managing the relationship to ensure success deserves careful thought and planning (Farrell & Coburn, 2017; Hassel & Steiner, 2012).

Summary of the Review

This literature review provided a discussion of the project genre, the white paper, and the project content followed by components that are necessary to improving student achievement and teacher efficacy. The components were continuous school improvement that emphasizes the 8-step continuous improvement model, collaboration, multiple measures of data, shared vision, and research from schools that have implemented the model. The research suggests that the 8-step process was effective in increasing student academic achievement on standardized tests in states such as Texas, Indiana, Arizona, and Tennessee.

White papers advocate a position as the best solution for a particular problem, present an argument, report results, and give the reader valuable information to make informed decisions (Canright, 2013). The white paper project of this study will include a description of the problem of low reading achievement present among middle school boys in the local district. The white paper will also report the findings of a comparison of STAAR reading assessments scores among school types (single-gender and coeducational), and recommendations for implementing the 8-step continuous improvement model as a potential solution to address the problem and increase student performance on STAAR assessments.

Project Description

The process for creating the project consisted of writing a white paper report based on the conclusions of the data analysis and the literature review. After the completion of the project study and degree awarded, the white paper will be delivered to the assistant superintendent of intensive support, as well as the superintendent of the local school district. In addition, the white paper will be presented to principals of middle schools who are struggling with the problem of low reading achievement among middle school boys.

Needed Resources and Existing Supports

Creation of this project required resources such as photocopies of the white paper project, a laptop, projector, projector screen, and a venue for conducting the presentation of the white paper to the principals. The assistant superintendent of the local district has agreed to review this project and assist in arranging a presentation of the white paper to school level administrators of priority middle schools in the local district. Outside the local district, educators who provide support and technical assistance to campuses and districts with school improvement requirements have expressed support for the project. Many are aware of the current study and share my interest in finding a solution to the low reading achievement among middle school boys. There is a great deal of camaraderie and encouragement for those pursuing doctorate degrees. I have confidence that I will be able to present my project to colleagues at our regional collaborative meeting.

Potential Barriers and Solutions

A potential barrier to this project is the superintendent's rejection of the study's findings and refusal to allow the presentation of the white paper. Additionally, school board and community members may question the validity of the findings and deny the white paper to be made public. Also, the principal and teachers may not want the study's findings to be released to district-level administrators for fear of losing their jobs. Thus, the project would not meet its intended outcome of recommending the implementation of the 8-step continuous improvement process as a school reform strategy to increase student proficiency on the STAAR assessments. To address these potential barriers, I will participate in any requested question and answer sessions to clarify the research, discuss findings, and give recommendations before the presentation.

Proposal for Implementation and Timetable

After Walden University's acceptance and approval of this doctoral project study, I will contact the superintendent of the local district and schedule a meeting to review and deliver my white paper to him. At the meeting, I will ask him if he would like me to create a presentation for district-level administrators or school board members to share the results of my study and the highlights of my white paper. We will also discuss the possibility of a presentation of the white paper to principals of middle schools who are struggling with the problem of low reading achievement among boys. In addition, a copy of the project study and white paper project will be delivered to the local district's research review board as required.

Roles and Responsibilities of Student and Others

Writing, addressing any questions, and delivering the white paper to the superintendent will be my primary responsibility for this project. The superintendent will be responsible for approving the presentation of the white paper to school and district-level administrators and the local school board. He may ask that I work with the assistant superintendent of intensive support to arrange a presentation of the white paper to school administrators of priority middle schools in the district. Upon request, I will create a PowerPoint presentation of my findings and recommendations for implementation of the 8-step continuous improvement model. I will request a timeline for completion of the PowerPoint and ask for potential dates for the presentation.

Before the presentation, I will encourage school administrators to approach the session with an open mind, listen to everything presented, and ask questions. Following the presentation, I will request attendees to fill out an evaluation onsite or an online survey. Either of these methods could assess understanding of the concepts presented in the white paper and ascertain interest in implementing the 8-step process. Should administrators need clarification on any aspects of the white paper, I will provide it. If requested, I will also work with school administrators and teachers to implement the steps presented in the white paper. My hope is that school administrators will ask for more information pertaining to how best to implement the 8-step process discussed in the white paper. If school administrators implement the process described in the white paper, reading achievement within the local school district may improve for students, particularly middle school boys.

Project Evaluation Plan

Project evaluations provide a systematic investigation of the merit of a project and are essential to a continuous improvement process (Spaulding, 2014). Project evaluations also provide information for communicating to a variety of stakeholders and allow projects to prove their worth (Spaulding, 2014). The goal of this project is to recommend the 8-step process as a potential solution to address the problem of low reading achievement among middle school boys and increase student performance on STAAR assessments. This project presents an opportunity for administrators to engage in the process of implementing the 8-step continuous improvement model.

Two main types of project evaluations are formative and summative (Evaluation Toolbox, 2010; Spaulding, 2014). Formative evaluations take place before or during a project's implementation with the aim of improving the project's design and performance. Summative evaluations measure the influence of an intervention on the target group and occur at the end of project implementation (Evaluation Toolbox, 2010; Graham, 2016). An outcome based, summative approach will be conducted to evaluate the influence of the white paper on the reading scores of middle school male students in the district. I chose this method because summative evaluations are associated with quantitative methods of data collection and focus on the outcomes of the project implementation (Evaluation Toolbox, 2010; Spaulding, 2014).

Student scores from the STAAR reading assessments administered will be utilized as quantitative data to evaluate the outcome of implementing continuous school improvement in participating schools. The intended goal of the evaluation selected is to

engage stakeholders (teachers and administrators) in a data analysis to examine STAAR assessment results at the end of the first year of the implementation of the continuous school improvement model. These data could be used to justify implementing the continuous school improvement model in more schools, identify the need to make modifications to the structure of the model, or discontinue the use of the presented school improvement model.

Project Implications Including Social Change

The white paper developed as the project for this study has the potential to influence students in several ways. First, the local problem of low reading among middle school boys may be addressed. If the recommendations are followed by the local district, positive social change may occur. Finally, the broader context of education may be affected in a variety of settings.

Local Community Stakeholders

The original problem addressed in this study was an ongoing reading achievement gap among middle school students in a public school district in Texas. Performance data showed girls consistently outperformed boys on state assessments of reading (TEA, 2011b). Thus, a single-gender campus for boys was introduced in 2011. The original purpose of the study was to compare the two educational models to determine whether the single-gender model offered advantages over the coeducational model as measured by standardized reading test scores. The results of this study revealed that reading test scores for middle school boys in the single-gender school were not significantly different from those attending a coeducational school. The findings led to a search in the

professional literature for an alternative solution to increase reading achievement among male middle school students in the local district. The concept of continuous school improvement surfaced as an approach to enhance efficiency, effectiveness, and student outcomes (Best & Dunlap, 2014).

The project for this study evolved from the data collection and literature review, and the goal was to find a solution to increase reading achievement among middle school boys in the local district. The project was developed to recommend this solution to local stakeholders. The white paper may result in social change by introducing the 8-step model as a process that could potentially serve as a strategy to increase STAAR proficiency and aid middle schools in meeting state standards. Thus, the local district could experience a decrease in the number of middle schools placed in improvement required status. The process recommended in this project could also lead to social change within the local community by increasing the number of middle school boys reaching proficiency in reading as well as college and career readiness. In turn, the local community could potentially experience an influx in the number of students receiving post-secondary degrees. Finally, implementation of the recommended 8-step process could potentially lead to improvements in teacher performance and student growth (J. V. Brown, 2013).

Larger Context

Although the purpose of the white paper was intended to address the problem of low reading achievement among middle school boys within the local school district, the implementation of the recommended 8-step process could also benefit the local district as

an effective reform strategy in other grade levels and schools to increase proficiency in all subject areas. To comply with state and federal requirements calling for schools and districts to improve student proficiency levels on standardized tests, schools and districts throughout the United States could potentially benefit from the recommendation to implement the 8-step continuous improvement model offered within the white paper. It is my intent to expand my competence in this area and eventually service schools and districts as an external consultant for continuous school improvement. In doing so, my research on continuous school improvement will become ongoing in my effort to justify this reform as one that has the potential of improving student proficiency.

The findings of this study and project could also provide institutes of higher education and educational leadership preparation programs with empirical research on public single-gender education and insights into the concept of continuous school improvement, which could influence programs and instructional practices in middle schools. Also, the analysis and recommendations provided in this white paper may provide school boards considering single-gender schools with information that can help them weigh various perspectives on the topic. Further, this white paper may provide them with useful research on a key reform strategy that has potential to close the reading achievement gap.

Conclusion

Section 3 discussed the goals, rationale, supporting literature, description, evaluation, and implications for social change of this project. The project includes a recommendation of implementing the 8-step continuous improvement model as a reform

strategy to increase student proficiency on the STAAR assessments. Literature related to the concept of white paper, continuous school improvement, multiple measures of data, and the 8-step continuous improvement process were discussed. Section 3 concluded with an analysis of potential local and far-reaching implications for social change that could result from this project.

Section 4 will include reflections of the study and project development, strengths and limitations, as well as conclusions resulting from the project. A summary of the knowledge acquired related to change, leadership, project development, and scholarship will be provided. Section 4 will conclude with an analysis of self-awareness related to the project's development and implementation.

Section 4: Reflections and Conclusions

The problem addressed in the study was the lack of evidence on the efficacy of the single-gender educational model as compared to the coeducational model in increasing reading achievement for middle school boys in the local school district. The purpose of the study was to compare the two educational models to determine whether the single-gender model offered advantages over the coeducational model as measured by standardized test scores in reading. The results of this study revealed that reading test scores for middle school boys in the single-gender school were not significantly different from those attending a coeducational school. After obtaining these findings, I searched the literature for an alternative solution to increase reading achievement among middle school boys in the local district. My search led me to the concept of continuous school improvement, which is an approach to enhancing efficiency, effectiveness, and student outcomes (Best & Dunlap, 2014). The project for this study, a white paper, evolved from my data analysis and subsequent literature review.

Section 4 includes the project's strengths and limitations, as well as my conclusions and reflections based on the project. Section 4 also includes recommendations for alternative approaches and a discussion of what I learned in creating the project, specifically in the areas of leadership and change, project development, and scholarship. I share my personal reflections regarding my development as a practitioner, project developer, and scholar. I also provide a discussion of the project study's potential influence for social change. Section 4 concludes with applications, implications, and directions for future research.

Project Strengths and Limitations

Project Strengths

Regarding the content of the white paper, a strength is the focus on the local problem of low reading achievement present among middle school boys and recommendations for implementing the 8-step continuous improvement model as a potential solution to address the problem and increase student performance on STAAR assessments. This project provides school- and district-level administrators with a step-by-step process for implementing the 8-step continuous improvement model in middle schools within the local district, through which teachers engage in data-driven decision making and collaboration to improve academic achievement in schools (Davenport & Hinckley, 2012). The steps include data disaggregation, development of instructional calendar, instructional focus supported by research-based effective practices, frequent assessments, tutorials, enrichment, maintenance, and process monitoring (Davenport & Hinckley, 2012). Through the comprehensive use of data, implementation of the model could potentially result in improved teaching skills for every teacher and learning skills for every student.

Another strength of the project is the format of the white paper itself. White papers have become an effective format to inform school and district administrators, teachers, and community stakeholders of a problem and possible solutions for addressing it (Hoffman, 2013). In the white paper, I describe the problem of low reading achievement among middle school boys, present the findings of a comparison of STAAR reading assessments scores among school types (single-gender and coeducational), and

offer a recommendation for addressing the problem in an easy to read format. Another strength of this project is that the implementation plan includes a presentation to school administrators in priority middle schools. This step provides an opportunity to engage in discussion with school administrators to further elaborate on the contents of the white paper. Additionally, engaging with school administrators and clarifying misconceptions regarding the concept of continuous school improvement could potentially lead to further interest in the use of the suggested reform of the continuous school improvement process.

Project Limitations

The schools used in the data analysis were not randomly selected, which is a limitation of the project. The students who were studied belonged to pre-existing groups. The schools were already established as either single-gender or coeducational campuses, and the students chose to attend or were assigned to the schools prior to this study. Also, the schools assigned students to groups related to their ethnicity, economic level, mobility, and English proficiency, based on state and national standards. Therefore, the ability to generalize to the entire population of middle-school males in Texas and beyond its borders is limited.

Another limitation is that the population in this study was drawn only from two public middle schools (one single-gender and one coeducational) from an urban school district. Therefore, there are limitations in the project's application and generalizability to other populations. It may be possible that the sample may be generalized to similar demographic areas within the state. There are now other male single-gender public schools operating in Texas. Staff in other Texas public schools are exploring the option

of piloting the choice of single-gender classrooms, especially when faced with gender-gap issues in areas that affect performance for individual students, schools, and districts.

Recommendations for Alternative Approaches

In this study, I focused on examining the influence of single-gender education on reading achievement for middle school boys. The purpose of the study was to compare the two educational models to determine whether the single-gender model offered advantages over the coeducational model as measured by standardized reading test scores. I chose to conduct a quantitative causal-comparative study using 3 years of comparable archival data from STAAR reading assessments.

In addressing the problem of low reading achievement, the focus of this study could have been on the use of instructional ELA strategies as independent variables instead of school types. In doing so, the culminating project could have resulted in a handbook of researched-based instructional strategies to improve student achievement in ELA. Another recommendation could have been to examine teacher perceptions of the problem rather than student test scores. The collection of data from questionnaires, interviews, and focus groups could have resulted in a professional development project designed to address the findings and specific needs of teachers.

I could have also included data from several school districts facing the same gender-gap issue found in the local district. Data collected across several districts could have added to the validity of the study and strengthened the findings. Results could then be generalized across other districts throughout the state with similar demographics. Acknowledging these other possibilities, I am still confident that the white paper project

resulting from the data analysis of this study will prove useful to both the local district and other public schools in addressing the problem of reading achievement among middle school boys.

Scholarship, Project Development, and Leadership and Change

Scholarship

My experience as a doctoral student at Walden University has resulted in extensive growth as a scholar. Through this journey, I have developed a solid foundation of educational research and have improved my ability to identify and interpret peer-reviewed sources to construct research-based writing. I have also become competent in reviewing and then synthesizing literature through online databases. Due to the topic of my study, I have improved my ability to use related search words and phrases to locate research related to a topic. My research experience has resulted in further developing an understanding of primary and secondary sources as well.

Through the structure of this doctoral program, I have learned to collaborate and learn in a virtual learning environment. Online programs differ from traditional programs in that the face-to-face collaboration with faculty members and peers does not exist. Therefore, I have learned to use various electronic sources such as email, discussion, chat, and Skype to communicate. As a result, my comfort level with technology has grown tremendously. At the onset of this program, my greatest obstacle was overcoming being intimidated by APA style writing and ensuring that my writing had appropriate grammar and punctuation. I quickly learned to use reference manuals and online

resources to ensure proper formatting to improve my level of scholarly writing at the doctoral level.

The greatest area that I have grown throughout this process is in my knowledge of the concept of quantitative data. Initially, the idea of statistics was intimidating to me, and I felt uncomfortable. Through step-by-step research, as well as ongoing guidance and support from my committee members, I was able to carry out the steps of the data analysis process and analyzing the data results. Additionally, my coursework at Walden University has improved my competence and confidence as a consultant for districts and schools. This experience has improved my ability to identify problems and conduct research to seek possible solutions for continuous school improvement.

Project Development

The process of solidifying the project type for this study was tedious. I learned that project development requires purposeful thought and consideration. During the proposal stage of this study, I had a project idea that included creating professional development sessions on gender-based instruction to help teachers to understand the different learning needs of boys. I eliminated this option because training teachers would not be a solution to the problem addressed in this study. I then thought about creating a school board training module on the benefits of single-gender schooling to be presented to the local district school board and surrounding districts considering implementing the single-gender model. However, I discovered after the data collection and analysis that a board training module would not be the best option for a project because of the findings of the study. Although both project ideas were doable, they were not solutions to the

problem. From this realization, I learned that I could not determine a viable solution until I analyzed the data related to the problem.

As I focused on the findings and problem of the study, I realized the importance of being flexible in creating a solution. Colleagues and family members will attest to the fact that flexibility is not one of my best character traits. With that in mind, I reviewed many dissertations, journal articles, and newspaper articles to get ideas for a project. During my research, I discovered the white paper report, which varies from informal reports to formal reports; and the purpose is to report information and recommendations to a targeted audience (Sachiko et al., 2015). I wanted to share the findings of my doctoral study with school and district-level administrators and propose a solution to the problem, which meant that creating a white paper option was a viable one for my project study. Through the writing process, I was able to explain the reading achievement gap among middle school boys and girls, share my findings, and develop recommendations to help educators increase male reading achievement and close the reading achievement gap.

Leadership and Change

Throughout the creation of this project study, I learned that leadership is about being a good follower. I learned to follow advice from my doctoral chair and committee members. This concept also influenced my professional thought process. My role as an educational consultant is to provide support and technical assistance to campus and district leaders with the implementation of required interventions in the state

accountability system. I have learned that my focus should be assisting in building leadership and teacher capacity focused on the sustainability of school improvement.

The process has also inspired me to be an agent for change. I want to improve systems and instructional practices to influence student performance. I have become an advocate for continuous school improvement. By working with various school settings and diverse campus needs, the 8-step continuous improvement process could be a much-needed change to improve teaching and learning. Further, my ability to lead and serve as a coach, mentor, and supporter of administrators has increased tremendously through the skills and concepts that I have acquired in this program.

Analysis of Self as a Scholar

My intent as a scholar was to create an original project to address the problem of low reading achievement among middle school boys and offer a solution to increase student proficiency. Through this process, I experienced growth in my ability to analyze peer-reviewed and research-based literature to offer a solution to a problem. I have learned to develop a proposal, collect and analyze data, use SPSS software to present the findings, and create a project for implementation with educators, and reflect on my work. In addition, I examined how positive social change can come about through a research study project. Through developing this project study, I have been afforded the opportunity to become a researcher. This process has also allowed me to see myself as a scholar.

Analysis of Self as a Practitioner

As a practitioner, completing this study contributed to my ability to seek research-based interventions and practices to address the campus needs identified and facilitate the strategic planning process of implementing such practices effectively. Extending my knowledge regarding best practices in school improvement, led to my ability to positively influence student performance within the various school settings that I serve.

I became enthusiastic about continuous school improvement and saw it as a solution to improve student learning and school processes. I am an educator who believes that all students can learn and that they are the future. It is up to educators to refine their practices to ensure that all students learn and graduate college and career ready.

Through self-analysis, I am a practitioner who is a leader and life-long learner. I have acquired a deeper understanding of continuous school improvement, which has allowed me to sharpen my analytical skills. Continuous school improvement is the ongoing measuring and evaluating processes to identify and implement improvement (Bernhardt, 2013). I see continuous school improvement as a response to student, teacher, and school learning needs. This process has enhanced my professional growth.

Analysis of Self as a Project Developer

During my residency at Walden University, I learned that the intent of a project study was to attempt to solve a problem to lead to social change. I was eager to complete a project study because I wanted to examine the influence of single-gender education on reading achievement and provide district leaders with data that may be useful in making

policy decisions regarding the effectiveness of the program and in making decisions about future programs.

As I progressed through the doctoral project study, I discovered that developing a project was not easy. Early in the proposal stage, I assumed that the data analysis would show a positive relationship between the single-gender model and reading achievement; however, through the data analysis, I discovered that the results of my study did not turn out that way. For several weeks, I focused on project ideas that were based on my assumptions, rather than the results of the data collection and analysis. These results were difficult for me to acknowledge because I felt as though I had failed. Through many conversations with my doctoral committee chair, I was able to progress through my research findings and focus on a viable project, which became this white paper report. I realized that this white paper was the best option to present my research findings and offer a recommendation to campus and local district leaders.

Although I have produced many projects throughout my career, I have never created a white paper report. A white paper provides an overview of a problem and offers solutions. To me, the white paper was a culmination of all of the hard work I had done. It presented the local problem, shared relevant data about the problem, as well as a recommendation to solve the problem. The white paper provided a thorough overview of the reading achievement gap among middle school boys and girls and proposed a key reform strategy that has potential to close the reading achievement gap.

I also learned that writing the white paper required me to synthesize my doctoral project study into a concise document. It was difficult to condense the entire review of

research and data analysis into a few pages. I worked with my committee chair and the Walden Writing Center for assistance with this. I also read several white papers to help me to organize my white paper in a manner that would make sense to the reader and convince them to implement the 8-step continuous improvement model to help close the reading achievement gap.

Reflection on the Importance of the Work

The mission of Walden University is to "provide a diverse community of career professionals with the opportunity to transform themselves as scholar-practitioners so that they can effect positive social change" (Walden University, 2016, Vision, Mission, and Goals section, para. 2). To effect positive social change, this project study addressed the problem of low reading achievement present among middle school boys in a local district as measured by performance on the STAAR reading assessments. Schools and districts face increasing levels of accountability for students to perform proficiently. Low performance on the STAAR reading assessments has resulted in state accountability campus-level interventions, closure, or the appointment of a board of managers to oversee district operations (TEA, 2015). This project could lead to social change by serving as an effective reform strategy for schools and districts to implement so that teachers are better able to maximize the level of instruction to ensure learning for every student. On a greater scale, this project has a potential influence on social change throughout the United States. The 8-step continuous improvement model could be a possible solution for improving student learning and proficiency in all content areas at every instructional level.

Implications, Applications, and Directions for Future Research

The intent of this study was to address the problem of low reading achievement experienced by middle boys within an urban school district in northern Texas. I sought to determine if there were significant differences in reading achievement among middle school boys in a coeducational middle school compared to a single-gender school. Based on the findings of the study, there was no statistically significant difference in the mean scores among students attending the two educational settings, which indicated that the single-gender model did not have a differential effect on middle school boys' reading test scores.

One implication of this study emerged from the analysis of STAAR reading scale scores over the 3-year period. Mean performance levels for study participants were at satisfactory levels for each year tested. This implies that the planning and delivery of instruction in the two educational settings had a positive effect on student learning. Table 2 includes the actual range of scores for each of the performance levels for the 2011-2014 school years. To improve student learning, educators must first understand the system that produced the results before plans for improvements can be made (Bernhardt, 2013). Implementation of the 8-step continuous improvement model has the potential to provide schools and districts with an understanding of why middle school boys have not exceeded the state's satisfactory standard in reading achievement.

Recommendations for Practice

Schools and districts face increasing accountability to ensure students are well prepared for postsecondary success. Findings from the data indicated a need for schools

to use a strategy that could assist in identifying students and skills in need of intervention. The 8-step continuous improvement process has the implication of providing schools and districts with a structured cycle of analyzing assessment data to create instructional plans and practices to meet the individual needs of each student. This study and culminating project could also serve as a framework for elementary, middle, and high schools to increase proficiency and overall student learning in all content areas. An additional recommendation influences planned school accountability changes in Texas. Beginning in the 2017-2018 school year, the student growth measure will be a required component of the teacher appraisal systems in Texas. This measure will count for at least 20% of a teacher's summative score. Using the 8-step continuous improvement model has implications to improve teacher practice and ultimately, improved student learning.

Application of this study and project is recommended for all priority middle schools within the district. This study and project will be made available through the sharing of the white paper to school and district-level administrators during presentations. As an educational consultant, it is my intent to use my research to further assist in building the capacity of campus and district leaders, teachers, and staff to implement and understand best practices in school improvement. Thus, my research on facilitating the implementation of continuous school improvement processes will extend beyond the scope of this study.

Future Research Directions

In this study, I focused on the influence that single-gender education had on middle school boys' reading achievement. The merits of single-gender education as a

means to improve academic performance remain contested (Riordan, 2014; Salomone, 2013; Signorella et al., 2013). It is my hope that this study's findings will inspire others to explore the implications of single-gender education. Future studies will add to the debate on the merits of single-gender education and its influence on male students (Dwarte, 2014). Future research on single-gender education in the public sector is necessary to contribute to the professional literature on education in the United States.

Research that focuses on single-gender education in coeducational schools may provide an excellent arena for investigation. Since there are not many male single-gender campuses in Texas, future research could replicate this study using coeducational schools with single-gender classes. The research could determine the influence of the single-gender model on test scores of male students versus those taught in mixed-gender classes.

In addition, my study population was middle school boys in sixth through eighth grades. Additional research, such as longitudinal studies on public single-gender education and its potential to positively affect populations of varying levels and subpopulations is essential to help further understanding of the influence of public single-gender education. This research needs to be conducted before questions of effectiveness can be answered, I believe. As noted in Section 1, reading is essential for educational attainment and citizenship (Bansmith, 2012). A study in which researchers follow students from elementary through high school or beyond could provide evidence of long-term effects.

Conclusion

Section 4 focused on my conclusions and reflections from the doctoral study journey. I discussed project strengths, limitations, and recommendations for alternative approaches to the local problem. This section also included my reflections on leadership and change, project development, scholarship, and myself as a practitioner, project developer, scholar, and the influence that this study may have on social change. In this causal-comparative study, I used archival data from STAAR reading assessments to determine the efficacy of the single-gender model for middle school boys. Results of the statistical analysis conducted on STAAR assessments indicated average mean scores did not reveal a statistically significant difference from any of the 2011-2012, 2012-2013, and 2013-2014 school years tested. The findings of this study indicated a need to search for an alternative for school and district-level administrators to consider as a solution to the problem of low reading achievement among middle school boys. The outcome of research resulted in a white paper project presenting the problem, study findings, and recommendations for implementing the 8-step continuous improvement process. Although this study was limited to the use of data from two middle schools, the results and recommendations made have implications for increasing reading proficiency and student learning in all content areas at every school level.

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Appendix A: The Project

Increasing Reading Achievement of Middle School Boys

in Single-Gender and Coeducational Schools

Jean Hunter-Batty

White Paper Report

Walden University

Introduction

This white paper report begins with an overview of the problem prompting the study. Findings from the study are presented, followed by a review of the literature on the concept of continuous school improvement. The white paper report concludes with recommendations for school and district-level administrators to consider as a solution to address the problem and increase student performance on the STAAR assessments.

The Problem

The problem addressed in the study was the lack of evidence on the efficacy of the single-gender educational model as compared to the coeducational model in increasing reading achievement for middle school boys in the local school district. Leaders in the local district implemented the single-gender model to address the problem of an ongoing reading achievement gap among middle school boys and girls. The 2007-2011 performance data in the local school district showed girls scoring higher than boys on state reading assessments (Texas Education Agency [TEA], 2011b). In August 2011, the school district opened a single- gender campus for boys in Grades 6 through 9. Although the school had been operational for multiple school years, it was not known to what extent the public single-gender educational model was effective in addressing the problem of reading underachievement.

According to the 2011-2014 district performance data, middle school girls continued to score higher on state reading assessments than middle school boys (TEA, 2013; 2014). Sixty-four percent of boys (n = 9,420) scored at or above the satisfactory level on the 2011–2012 state reading assessment, compared to 71% of girls (n = 10,290;

TEA, 2013). District data from the 2012-2013 and 2013-2014 school years showed that boys scored lower in reading than girls with a 5% to 7% difference between the groups (TEA, 2014). The differences in reading shown in this historical performance data indicated a steady pattern in lower reading achievement for boys than girls. Moreover, the inability to read put students at risk for poor educational attainment (National Education Association, 2008). Many students who academically fall behind in middle school are unable to catch up when they reach high school. For example, 84% of boys (n = 3,390) in the class of 2014 graduated, compared to 90% of girls (n = 3,825; TEA, 2014).

While these data further support the need for the single-gender school for boys implemented in the local district, no student-level data had been analyzed to determine the efficacy of the model. Although operational for multiple school years, the influence of the program was not known. Educators and parents in the local district may benefit from an investigation of the program and its influence in addressing the problems of low reading achievement among middle school boys.

Findings of the Study

I conducted a cross-sectional quantitative causal-comparative research study to determine if there were significant differences in reading achievement among middle school boys in a coeducational school compared to a single-gender school. Two middle schools (i.e., one single-gender and one coeducational) from an urban school district in Texas were the setting for the study. The sample for this study consisted of 386 male students in Grade 6 (2011-2012), Grade 7 (2012-2013), and Grade 8 (2013-2014) who

were enrolled, but not necessarily continuously, at the two participating schools. The students attended either the single-gender school (n = 256) or the coeducational school (n = 130).

Archival data from the STAAR were analyzed using a one-way ANOVA and Kruskal-Wallis H tests to determine if there were significant differences between school types as measured by the dependent variable, reading test scores. Results of the three statistical tests conducted on STAAR reading assessments from 2011-2012, 2012-2013, and 2013-2014 school years revealed no statistically significant difference for any year tested between students enrolled at the single-gender campus and students enrolled at the coeducational campus. As illustrated in Table A1, p-values for each year were greater than the significance level of .05 among the student groups.

Table A1

Inferential Statistics for Reading (R) Achievement Reported by Year, Grade, and School Type

Year	Grade	School type	*n*	*M*	*p*
2011 – 2012	6 (R)	S1	102	1663	.757
		C1	45	1673	
2012 – 2013	7 (R)	S1	83	1699	.085
		C1	44	1726	
2013 – 2014	8 (R)	S1	71	1745	.226
		C1	41	1768	

Note. S1 = single-gender; C1 = coeducational.

Findings of the study revealed that reading test scores for middle school boys in the single-gender school were not significantly different from those attending a coeducational school. The findings led to further research for an alternative solution to address the problem of reading underachievement among male middle school students in the local district. Using the following Boolean operators: *white paper, grey literature, continuous school improvement models, increasing student proficiency, data analysis, data models, assessments, PDCA, multiple measures of data, and 8-step continuous improvement process*, the concept of continuous school improvement surfaced as a possible solution. Additional research (Bernhardt, 2013; Davenport & Anderson, 2011; Davenport & Hinckley, 2012) led to the recommendation for school and district-level administrators to consider implementing the 8-step continuous improvement model as a possible solution.

Review of the Literature

An abbreviated review of the literature regarding the continuous improvement process provides the foundation for the recommendations to follow. First, the concept of continuous school improvement, including processes and strategies, is discussed. This is followed by a discussion of the role of data collection and analysis in the continuous improvement process.

Concept of Continuous School Improvement

Continuous school improvement (CSI) refers to a district, school, or other organization's ongoing commitment to improving that organization's operations and deliverables. These improvement strategies are based on objective research data. The

processes incorporate these strategies into the daily work of individuals and the larger system and are repeatable under varying circumstances (Park, Hironaka, Carver, & Nordstrum, 2013). In the classroom, CSI uses timely, accurate data to guide and improve instruction. CSI will improve efficiency, effectiveness, and student outcomes (Best & Dunlap, 2014). By systematically testing potential solutions against specific, measurable goals, the CSI approach narrows the focus on solutions to problems (Bernhardt & Herbert, 2011; Buckner, 2013). CSI is built on the belief that improvement cannot be achieved intermittently but requires ongoing dedication to a process of learning, self-reflection, adaptation, and growth (Hidden Curriculum, 2014).

CSI involves a cyclical approach to problem solving. The approach allows stakeholders to (Flumerfelt & Green, 2013):

- reflect on their work,
- identify problem areas,
- pilot potential solutions to those problems,
- observe and evaluate interventions, and
- adapt interventions based on data collected.

One model of CSI is the Deming wheel or Deming cycle which has been used to improve student learning in several schools and districts (Hinckley, 2012; Schilawski, 2016). The Deming Cycle of Plan-Do-Check-Act is also known as PDCA. The PDCA cycle is a systematic method for gaining valuable learning and knowledge for the continual improvement of a process (Bernhardt, 2013; Deming, 2015).

The PDCA cycle includes four stages (Beitsch, Carretta, McKeever, Pattnaik, & Gillen, 2013; Bernhardt, 2013):

- Plan: A continuous improvement team studies an identified problem, collects baseline data on that problem, details potential solutions to that problem, and develops an action plan.
- Do: The team implements its action plan, collects data on its intervention, and records outcomes.
- Check: The team compares baseline and new data, analyzes results, and documents lessons learned.
- Act: Depending on the success of the program, the team determines whether to adopt, modify, or abandon its tested solution.

Educational organizations that have implemented CSI plans have experienced positive results, including decreased failure rates, an improvement in Advanced Placement success levels, and more efficient budgeting; as well as increased homework completion rates, kindergarten readiness, and college enrollments (Flumerfelt & Green, 2013; Park et al., 2013).

Role of Data in Continuous School Improvement

Successful CSI requires that the responsible team take a long-term, far-reaching look at a school's status by examining data measuring school processes as well as student achievement and attitudinal data to ensure learning growth for every student. Schools need to rethink current structures as to making minor changes to existing strategies and interventions (Bernhardt, 2013). To accomplish this task, CSI utilizes various

methodologies to gather, analyze, and report a range of indicators of student learning gathered at multiple points in time, within and across subject areas (Bernhardt, 2013). To ensure improved teaching throughout a system, teams of principals, teachers, and other professional staff meet and collaborate in an iterative cycle of improvement (Riches, 2016; Slabine, 2011). CSI is based on a comprehensive assessment of student, teacher, and school learning needs. Teams use data to specify student learning needs and research best practices to identify effective classroom strategies: examining student work, performing action research, and developing formative assessments (Slabine, 2011).

Multiple measures of data. Multiple sources of data offer a more balanced and inclusive analysis of student, educator, and system performance than any single types or sources of data can provide (Riches, 2016; Slabine, 2011). Multiple measures of data fall into four categories: demographic, perceptions, student learning, and school processes (Bernhardt, 2013). Demographical data such as student enrollment, age, gender, ethnicity, and special needs populations, can be used to predict trends in the student population to allow school personnel to anticipate and plan proactively for upcoming changes in educational needs (Bernhardt, 2013).

Perception data are important to CSI because perceptions set the tone of the school climate (Bernhardt, 2013). School climate is the shared attitudes, beliefs, and values, that affect interpersonal relationships among students, teachers, and administrators that influence students' achievement (Childs, Kincaid, George, & Gage, 2016). Student perceptions can provide information that is often not accurately observed in formal classroom visits by principals or evaluators, and students have viewpoints that

can benefit the school improvement process (Barge, 2013). Teachers should use student perception data as a tool in continuously improving and setting learning goals for themselves and their instructional practice (Barge, 2013). Other forums, including interviews, focus groups, questionnaires, and self-assessments that involve stakeholders, can provide useful information. These diverse approaches add important data that assist in understanding perceptions.

Student learning data, including grade point averages, standards assessments, standardized tests results, and authentic assessments, represent the most commonly used data source in schools (Bernhardt, 2013). CSI requires a synthesis of this data, disaggregated by student demographic groups, by teachers, by grade levels. This research is longitudinal and is accomplished by following the same groups of students (cohorts) over time (Bernhardt, 2013). Collective as well as individual student data identifies those students proficient in essential skills and those requiring improvement. Analyzing student learning data across grade levels confirms a school's instructional coherence, and whether it has aligned curriculum, instruction, and assessment within and across grade levels (Bernhardt, 2013).

Assessments are the most commonly used forms of student learning data (Ainsworth & Viegut, 2015; Bernhardt, 2013). Assessments are used as measurements *of* and *for* learning. A measurement of learning, or summative assessment such as the STAAR test administered in the state of Texas, is used to assess learning after instruction has occurred, and support letter grades, and/or levels of proficiency (Ainsworth & Viegut, 2015). A measurement for learning, or formative assessment, "is an ongoing

process in which classroom teachers assess students' knowledge and understanding with activity-embedded, brief, small-scale tasks that are linked directly to the current curriculum topic" (Ainsworth & Viegut, 2015, p. 6).

Assessments for learning help "teachers gain insight into what students understand to plan and guide instruction, and provide helpful feedback" to students (Bernhardt, 2013, p. 54). Formative assessment results are intended to: accurately interpret student learning needs, set individual classroom goals as well as grade- and course-level team goals for student improvement, identify and share effective teaching strategies to accomplish goals, plan ways to differentiate instruction and correct student perceptions, and inform students about their current progress so teachers can adjust their learning methods and strategies (Ainsworth & Viegut, 2015).

School process data allow schools and school systems to look beyond performance data to analyze school processes that may be contributing to the state of the school's performance data (AdvancED, 2011; Childs & Russell, 2017). School processes include methods and intervention actions administrators take regarding the curriculum, instruction, and assessment strategies (Bernhardt, 2013). Understanding a school's processes is the first step in clarifying how a school is achieving its goals and getting its results. School process data tell about the way the school works, indicates how results are being obtained, and indicates what is working and what is not working in the school (Bernhardt, 2013). School processes are the only measures over which a school has complete control in an education setting. For a school to see changed scholastic results, the school must be willing to change its processes. For the school to make changes, there

must be a buy-in on the part of its stakeholders. School staff must agree that change is necessary to determine the processes to be altered or abandoned to achieve agreed-to desired outcomes (Bernhardt, 2013).

Shared vision. CSI requires schools to focus on a shift from compliance to a commitment by implementing a shared vision in a manner that will lead to improved teaching and ultimately increased learning for all students (Bernhardt, 2013). The school's vision, goals, and student expectations must reflect the core values and beliefs of the staff, merged from personal values and beliefs. After analyzing multiple measures of data and determining what is and is not working and why, school staff members need to study and discuss the implications of teaching current and future student populations. Additionally, staff members need to identify changes needed in the school's curriculum, instruction, assessment, and environmental approaches to implementing best practices, and then create a vision for where they want to go (Bernhardt, 2013).

Solving the Reading Achievement Gap Problem

The findings of the current study indicated a lack of efficacy of the single-gender model as a solution to the problem of low reading achievement among middle school boys. Subsequently, an additional search of the literature was conducted for a solution to the problem. The recommendation of the 8-step continuous improvement process is based on these findings and literature review.

The 8-Step Continuous Improvement Process

An approach to implementing continuous school improvement called the 8-step continuous improvement process, could be effective in single-gender and coeducational

schools. This process was created to provide educators with a significant tool in providing the structure and accountability needed for schools and school districts to close achievement gaps as measured by standardized test scores (Garcia, 2012; Hinckley, 2012; Schilawski, 2016). Reform efforts in Brazosport, Texas led to the development of the 8-step process. In 1991-1992, after the realization that students in low-income areas of Brazosport Independent School District (BISD) routinely failed standardized tests in which students in more affluent areas of the district routinely passed, the district began to seek a solution to close the achievement gaps (Graham, 2016). The district began to analyze data on teachers experiencing the most success with economically disadvantaged students. The results led to the school-wide, and eventually district-wide, implementation of an 8-step process. By 1998–1999, BISD had received national accolades from public and private organizations for showing impressive gains resulting in 91% of students in all demographic groups achieving passing scores in reading, math, and writing (Anderson, 2012). Several districts employed the model in the late 1990s and early 2000s. More recently, there has been recurring interest in the instructional model at both the small school district level as well as a large urban district initiative, such as the one in this study (Edwards, 2015).

BISD embedded the 8-step process (Table A2) into the four parts of the PDCA instructional cycle (Edwards, 2015; Garcia, 2012).

Table A2

PDCA and 8-Step Continuous Improvement Process

Plan	Do	Check	Act
		8-Step Continuous Improvement Process	
1. Data Disaggregation	3. Instructional Focus	4. Assessment	5. Tutorials
		7. Maintenance	6. Enrichment
2. Instructional Calendars		8. Monitoring	

Note. The 8-Step Process for Continuous Improvement is from Davenport and Hinckley (2012).

As shown in Table A2, the model consists of an 8-step process that is a data-driven, cyclical continuous improvement approach and is appropriate for the problem addressed in this study. The steps include data disaggregation, development of instructional calendar, instructional focus supported by research-based effective practices, frequent assessments, tutorials, enrichment, maintenance, and process monitoring (Davenport & Hinckley, 2012).

Step 1: Data disaggregation. Using data in the classroom is essential for reading instruction, but allotting time for teachers to learn from each other is equally important. Collaboration is vital in the implementation of data-driven practices, such as discussing problems surrounding student-learning or working together to find possible instructional strategies to remediate these concerns. The best way to collaborate is to identify a team and set expectations by establishing structured collaborative meeting times and adopting

a systematic process for data analysis to improve teachers' ability to meet students' individual needs (Jackson, 2013).

Principals and teachers learn to analyze STAAR data to identify reading standards, objectives, and skills that require improvement. At the beginning of each school year, summative assessment data are disaggregated by school, grade level, teacher, student, and student subgroups—ethnicity, gender, special education, ED, and ELL. This step is to determine which student' needs are met and which are not. The data are used to also determine areas of the curriculum that students perform well in and to target areas where more instruction is needed. Data are ranked by mastered skills from weakest to strongest, resulting in specific instructional goals for closing the reading achievement gap for middle school boys in the local school district. An analysis to identify which teachers are successful with which standards, as well as other factors that could potentially influence test results such as attendance, grade distribution, dropout rates, and behavior issues are explored (Brown, 2013).

Data disaggregation in the 8-step process requires quality team planning (Graham, 2016). Grade-level/ELA teachers meet on a weekly basis to discuss data from ongoing student assessments, collaboratively plan and share best practices for teaching reading standards, objectives, and skills. During this time, teachers identify mastered and non-mastered objectives by analyzing individual test items that require improvement, and identify which students learned each skill (e.g. make inferences, draw conclusions, summarize) and which students did not. Students having trouble are given extra time and

support to ensure their learning. Teachers also place skills in which students scored the lowest as high priority (Graham, 2016).

Data walls are used throughout the school year to provide visual displays of student progress on various assessments. Data walls include a color-coding system used by each teacher to indicate the level of performance for every student. Data is given a face by having every student represented on the teacher work room data walls. Students' levels of achievement are color-coded: students who are performing well above expected levels are blue; students who are on-track are green; yellow is used for students just below standard and need assistance; and red reflects students who have not mastered standards and need intensive support (Benson, 2014; Davenport & Anderson, 2011). "Data walls are updated after each formative and summative assessment" to assist teachers in identifying students in need of intervention (Davenport & Hinckley, 2012, p. 4).

Step 2: Instructional calendars. Step 2 of the 8-step process involves the creation of an instructional calendar, which is reviewed and modified annually based on data analyses of assessment results from the previous year. The instructional calendar outlines the sequence of instruction for addressing the objectives under specific reading standards identified in Step 1 to be the greatest for students. The instructional calendar divides each grading period into weekly blocks showing which skills will be taught and when formative and summative assessments will be administered. In this process, teachers can look down the road and provide the necessary supports in building upon student's knowledge and skills. As part of the 8-step process, instructional calendars are

displayed in classrooms, in common areas, and on the school website. The instructional calendars are made available to all teachers, students, parents and community members (Brown, 2013; Garcia, 2012; Graham, 2016).

Step 3: Instructional focus. The key to instructional focus is the success of students. The goal is quality instruction and student mastery. The instructional calendar guides the instructional focus within the 8-step process. Research-based best practices are reliant upon effective instruction to individuals, small groups or the whole class driven by the intersection of the instructional calendar and data results (Davenport & Hinckley, 2012). Teacher mentoring and support is provided to support the collaborative planning, continuous professional development opportunities, instructional focus, and sharing of best practices. Additionally, classroom walkthroughs are routinely conducted to ensure that teachers are addressing reading content and skills prioritized by the instructional calendar, employing effective strategies, and addressing needs identified through the analysis of formative assessment results (Brown, 2013; Davenport & Anderson, 2011; Davenport & Hinckley, 2012; Garcia, 2012; Graham, 2016).

Step 4: Assessment. Accountability reforms for student learning have created an increased emphasis on the belief that assessments can be an important lever for improved teaching and learning (Aristizabal, 2016). Regular use of assessment data provides educators with the ability to (Aristizabal, 2016):

- Better understand the academic needs of individual students, and respond to these needs by targeting instruction, support, and resources accordingly

- Better understand the instructional strengths and weaknesses of individual teachers, and use this information to focus professional development, peer support, and improvement efforts
- Support and facilitate conversations among teachers and instructional leaders regarding strategies for improving instruction.

Within the 8-step process, formative assessments are administered monthly to inform progress throughout the year. These formative assessments are intended to: check for student understanding, tell which students are learning and which need more help, chart student progress, adjust teaching methods to achieve better results, and modify the instructional calendar as needed for re-teaching or acceleration (Davenport & Hinckley, 2012). After each formative assessment, school administrators and teachers engage in half-day data meetings, to analyze data results. Teachers complete learning logs, which detail classroom formative assessment results by skill to examine outcomes, aggregate and disaggregate results, discuss what's working, and to determine where more effort is needed (Brown, 2013; Davenport & Anderson, 2011; Garcia, 2012; Graham, 2016; Schmoker, 1999). Schools that analyze and review data several times per month are more successful in decreasing the academic achievement gap than schools that only review data several times throughout the year (Lezotte & Snyder, 2011).

Steps 5 and 6: Tutorials and enrichment. *Data meetings* are used to assist ELA teachers in determining next steps of intervention for students who have not mastered reading standards, as well as determining enrichment for students demonstrating initial mastery. A school-wide 30-minute period is utilized to provide such intervention or

enrichment based on formative assessment results. Middle school boys needing intervention are assigned to ELA teachers in small groups. Those receiving enrichment are assigned to non-content area teachers. During this time, tutorials, games, manipulatives, graphic organizers, and technology are used to help students who did not master assessed skills. Students are re-assessed after concepts are re-taught, and those who master the skills participate in enrichment activities that provide intellectual challenges (Davenport & Anderson, 2011; Garcia, 2012; Graham, 2016).

Step 7: Maintenance. The 8-step process tends that maintenance is key to any long-range strategy to improve schools, and it is an especially powerful tool for at-risk students, such as middle school boys (Davenport & Hinckley, 2012). Maintenance helps to reinforce knowledge and skills previously taught. Review and maintenance of learned material begin immediately after the introduction of a new idea and continues throughout the school year (Davenport & Hinckley, 2012). Students maintain skills learned through a cyclical and periodic review of skills taught during class starters, daily oral language and learning software. Additionally, formative assessments include skills previously taught and tested to ensure students are retaining their understanding of previously taught concepts and skills (Benson, 2014; Davenport & Anderson, 2011; Downey, Steffy, Poston, & English, 2009).

Step 8: Monitoring. Ongoing monitoring of the 8-step process is conducted through process checks. Process checks are performed to help guide the school/district on its road to continuous improvement. During process checks, issues are discussed, and solutions are generated through the development of an action plan. The principal holds

the responsibility of monitoring the 8-step process at every step. The 8-step process requires the principal to (Edwards, 2015; Garcia, 2012):

- Conduct classroom walkthroughs on a regular basis
- Hold one-on-one student conferences
- Conduct monthly data meetings with grade-level/content area teachers
- Monitor grade-level/department-level team planning meetings
- Ensure that data walls are continuously updated
- Oversee implementation of the 30-minute period
- Celebrate success with teachers, students, and parents.

Research Supporting the 8-Step Process

In addition to the BISD, the 8-step process has been implemented in several schools and districts resulting in increases in standardized test scores (Anderson, 2012; Edwards, 2015; Steele, 2013). In 2002, the Metropolitan School District of Warren Township located in Indiana, a K-12 urban district, began to pilot the 8-step process in its lowest performing schools. From 2002- 2009, all schools in which the 8-step process cycle had been implemented experienced significant gains in ELA and math ranging from 9.6% to 35.3%, exceeding Indiana's growth rate each year. Due to the significant gains experienced in pilot schools from 2002-2009, the Indiana Department of Education implemented the 8-step process into 26 other low-performing elementary and middle schools (Davenport & Hinckley, 2012; Schilawski, 2016). Within 1 year of implementation 17 of 26 schools increased ELA and math proficiency on standardized ELA and Math assessments.

In order to measure the significance of the 8-step process for improving reading achievement scores for Spanish-speaking English Language Learner (ELL) students in the school, a 2012 study in an elementary school in a southern Arizona school district was conducted (Edwards, 2015; Garcia, 2012). The Arizona Instrument to Measure Standards (AIMS) reading achievement scores for third-grade ELL students during the 2009-10 school year and fourth-grade ELL students during the 2010-11 school year were assessed using a dependent samples t test to measure whether there was a significant difference in reading achievement after implementation of the 8-step process. Additionally, the researcher considered the difference in the reading performance categories on AIMS following implementation of the process for non-ELL students and ELL students. The AIMS categories consisted of Falls Far Below, Approaches, Meets, and Exceeds. The non-ELL cohort improved categories 23.3% when comparing the 2009-10 AIMS categories to the 2010-11 categories. The ELL cohort improved categories 58.3% when comparing the 2009-10 AIMS categories to the 2010-11 categories, showing significant differences between the increase in performance categories between the non-ELL and ELL cohorts at the $p = .015$ level of significance (Edwards, 2015; Garcia, 2012). Limitations of this study included a very small sample cohort of ELL students within one elementary school and the reduction of the sample due to the high attrition rate of the third- and fourth-grade ELL cohorts over the 2-year period (Edwards, 2015; Garcia, 2012). While the results indicated significant gains for the fourth-grade cohort for both ELL and non-ELL students, the researcher suggested extending the study to include a larger sample size within the researcher's district as well

as repeating the study with a sample group that consisted of different demographics (Edwards, 2015; Garcia, 2012).

Steele (2013) analyzed Tennessee Comprehensive Assessment Program (TCAP) scores on reading to determine if the 8-step process provided a framework to raise reading achievement among students and focus educators in identifying high yield strategies. Quantitative data were collected on the ELA TCAP assessments for the 2010-2011 and 2011-2012 school years. The results showed practical and significant differences in student growth as expressed by Tennessee Value-Added Assessment System (TVAAS) score. Furthermore, effect sizes were above minimum recommended values for schools that partially and fully implemented the 8-step process versus schools that did not implement the process.

Implementation of the 8-step process as a commitment to increase student achievement is viewed nationally as a significant tool in providing the structure and accountability required of schools and districts (Davenport & Hinckley, 2012; Schilawski, 2016). As schools and districts embark on implementing the 8-step process, organizations must commit to providing the time, culture, and resources for every child to be successful (Anderson, 2012). The 8-step process is intended to be a process of education reform, with the belief that all students can learn, given the proper resources and time (Anderson, 2012).

A common factor in implementing the 8-step process has been for districts and schools to contract external consultant companies or individuals to lead and monitor the process (Park et al., 2013). An external school improvement consultant provides

objective and expert guidance to carry out the process of school reform (David, 2014). The process of identifying and selecting an external contractor and then managing the relationship to ensure success deserves careful thought and planning (Farrell & Coburn, 2017; Hassel & Steiner, 2012).

Recommendations to Increase Reading Proficiency

Supporting individuals to effectively collaborate and become part of a team with shared goals, expectations, and responsibility to continuous school improvement may present its challenges. However, there are school processes and procedures that can be implemented to support these efforts. The researcher offers the following recommendations to the local school district to facilitate the implementation of the 8-step Continuous Improvement process.

To expect real changes in teaching and learning to happen teachers need opportunities to engage in quality professional development (Arnold, 2010). Provide ELA teachers with professional development in the area of collaboration, data-driven instruction, common assessments, and professional learning communities (PLCs) before the start of the process. Professional development in these areas will help teachers conceptualize the process. Engaging teachers in professional learning can begin during the summer. The local district requires returning and new teachers to attend 14 hours outside the work calendar, during the window of June and December. Planning periods, late-start days, after school or Saturdays can also be used as key opportunities for professional development.

Another early step in implementing the process is for schools to create collaborative groups to ensure achievement of school goals. Reorganize the traditional department structure and develop a master schedule that provides common planning times each week for ELA teachers to collaborate, plan, and engage in professional development. Other strategies to create the opportunity for collaboration are: building back-to-back elective classes into the master schedule on each team's designated collaborative day, starting the work day early or extending the workday each week, or scheduling extended time for teams to work together on staff development days and during faculty meeting time.

Step 1: Data disaggregation. It is recommended that administrators and ELA teachers disaggregate and analyze STAAR test data not only by accountability subgroups but also by gender to identify both students' and teachers' strengths and weaknesses and to improve teacher instruction and student learning. Focusing on specific student weaknesses, helps teachers and administrators to create a plan for student improvement. Identifying teachers' strengths and weaknesses enables administrators to provide effective quality professional development to improve instruction and student learning (Aristizabal, 2016).

Use data walls to keep the focus on students' achievement, visually displaying the status of learning by employing color-coding systems that are universally used by teacher teams (see Figure 1). Represent every student on the teacher work room data walls – giving data a face. Update following each formative and summative assessment so that

progress can be seen and so that continuing need is immediately identified for purposes of intervention.

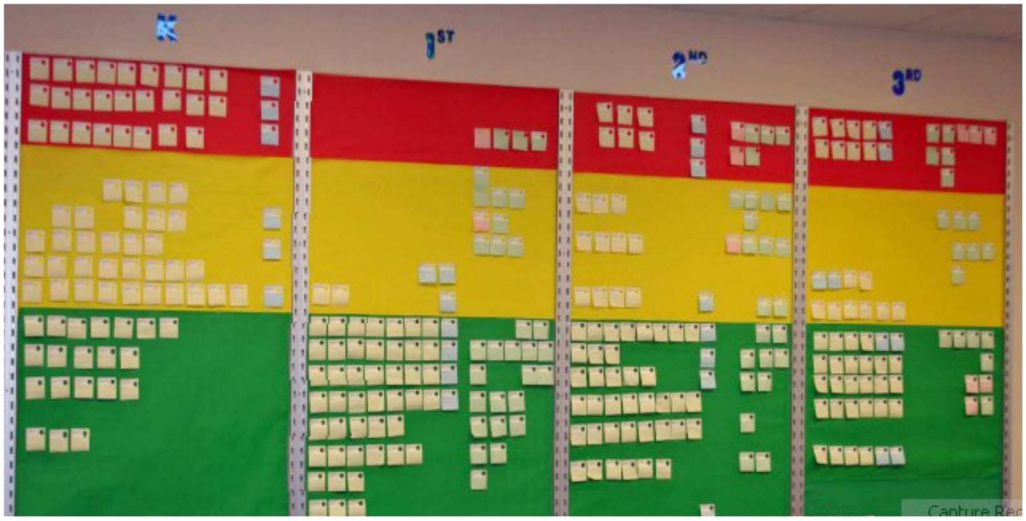

Figure 1. Visual representation of a data wall.

Step 2: Instructional calendars. Based on students' strengths and weaknesses, build an instructional calendar that includes all skills to be assessed. Grade level/ELA teachers focus on the same skill at the same time so that a trend analysis can be captured. The calendar should be flexible enough to allow for adjustments thus providing time for students to obtain mastery. The calendar must also allocate time for assessment periods and tutorials.

The TEA provides an item analysis summary report for each released STAAR test to assist teachers in identifying the skills that are in greatest need of improvement. The agency also provides test blueprints for reading to assist teachers in knowing what priority the state gives to each skill and what percentage of the STAAR test will address the skill. It is recommended that ELA teachers use these resources and study state standards and the district curriculum guide to build the instructional calendar.

Step 3: Instructional focus. Based on the instructional calendar, teachers are expected to teach the targeted content and skill. The goal here is quality instruction and student mastery. It is recommended that administrators and teachers use the item analysis summary report to develop growth targets**.** Administrators can use assessment results to monitor progress to support interventions, find needed resources, and provide help to teachers who are not successful. Teachers can also use the data to understand student responses and identify student needs to plan instruction and interventions.

Step 4: Assessment. It is recommended that teachers frequently use formative assessment strategies to assess student proficiency during the lesson. Following that, teachers should administer the same brief assessment to all students at the same grade level after each instructional unit, roughly once a week. Beyond that, it is recommended that each six weeks, teams administer a common cumulative exam and each spring, develop and administer practice tests for the STAAR exam. Schools that analyze and review data several times per month are more successful in decreasing the academic achievement gap than schools that only review data several times throughout the year (Lezotte & Snyder, 2011).

Steps 5 and 6: Tutorials and enrichment. It is recommended that schools restructure the daily schedule to ensure students have time to master the core curriculum. The restructuring could be accomplished by providing a block schedule with 90-minute instructional periods. Students attend core classes each day and attend elective classes every other day. Other flexible scheduling, such as a modified block or an alternating day block schedule could be used to adjust the length of class periods. Another

opportunity during the regular school day to provide additional time to students who need tutorials and enrichment/extensions for those who have mastered the TEKS at STAAR rigor is to create a 30-minute class in the master schedule. A potential challenge to flexible scheduling rest with finding the money to support new structures. The use of local district funds, Title I funds, or various grant funding may help support additional staffing needs. Regardless of the schedule used, students should be grouped according to individual needs and assessment results. Further, teachers must check for student understanding every week after the instructional focus (Edwards, 2015). As a result, the makeup of the groups will be ever-changing. Beyond this, schools can offer an extended day program for students who still need additional time for mastery.

Step 7: Maintenance. The STAAR represents the state's interpretation of the TEKS. Teachers need to align their teaching with the same format as the interpreted curriculum. To understand what the state curriculum requires students to know, it is suggested that teachers study the STAAR performance level descriptors, released test questions, assessed curriculum, and blueprint to increase their depth of understanding of the TEKS that are tested on STAAR and the rigor and format of the STAAR questions. Teachers should become experts in the lesson cycle with special focus on the skill check process and instructional strategies to reinforce learning at intervals that allow students to retain the information. Administrators and teachers must understand the use of data to drive instruction and model the use of data to determine needed interventions and learning goals. Enrichment must be provided for students who have attained STAAR mastery. This should be in the form of assignments that reflect the application, analysis,

synthesis, and evaluation of Bloom's taxonomy as well as the concepts and generalization/principles levels of Erickson's Structure of Knowledge. It is recommended that maintenance and ongoing reteaching continues until testing time.

Step 8: Monitoring. Leadership plays an important role in this step of the process. It is recommended that principals conduct walkthroughs to ensure that teachers are teaching the TEKS at STAAR rigor, addressing weighted objectives, and differentiating instruction based on individual student needs. It is suggested that principals provide feedback through meaningful conversations of what was seen, both positive and negative, with suggestions for how teaching can be improved. It is also suggested that the principal schedule data meetings with individual teachers and ELA grade-level teams to discuss benchmark data and identify areas of strengths and weaknesses for both teachers and students. It is the principal's job to ensure that the academic goals and priorities are being carried out, and that enthusiasm for student learning stays constant.

Conclusion

This white paper resulted from a study to determine the effectiveness of the single-gender model as a solution to the problem of low reading achievement among middle school boys in the local district. As the data from the study prompting the white paper indicated, 5 years of historical performance data by gender showed middle school girls consistently outperformed middle school boys on state reading assessments (TEA, 2011b). The differences in reading shown in this historical performance data indicated a steady pattern in lower reading achievement for boys than girls. The inability to read

puts students at risk for poor educational attainment (National Education Association, 2008). Many students who academically fall behind in middle school are unable to catch up when they reach high school. For example, in the local school district, 84% of boys (n = 3,390) in the class of 2014 graduated, compared to 90% of girls (n = 3,825; TEA, 2014). Schools and districts face increasing levels of accountability for students to perform proficiently. Low performance on the STAAR reading assessments has resulted in state accountability campus-level interventions, closure, or the appointment of a board of managers to oversee district operations (TEA, 2015). The concept of continuous school improvement and the 8-step continuous improvement process could potentially serve as an ongoing framework to guide instructional practices throughout the school year to ensure increased student learning and proficiency on STAAR assessments.

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Appendix B: Data Spreadsheet

Schools	Independent Variable
1	Single-Gender School 1
2	Coeducational School 1

VSRS	Vertical Scaled Reading Scores
PL	Performance Level
IV	Independent Variable
DV	Dependent Variable

			DV--6-8th Grade Scaled Scores by Student with Performance Level					
Student Level Data		IV	RQ1		RQ2		RQ3	
Student ID	Gender	School (code 1-2)	6th VSRS	6th PL—Reading	7th VSRS	7th PL--Reading	8th VSRS	8th - PL Reading