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Gender-Specific Instructional Strategies and Student Achievement in 5th Grade Classrooms

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Dedication

With warmest affection I dedicate this work to my children Erin and EL Dickey. You are my inspiration to work hard and strive for excellence. I am forever grateful for your patience throughout my graduate program as I know I can never make up for moments and time we lost as a family. In your own way you gave me encouragement each day. I love you.

I also dedicate this work to the memory of my father, Lyles Whitener, Jr., and my grandparents, Benjamin and Mary Wright and Lyles, Sr., and Gertrude Whitener. I have felt your spirits lifting me throughout this process.

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Abstract

There are three purposes of this mixed methods phenomenological case study. First, the researcher attempted to determine if there is evidence that teachers in single-sex classes adjust the delivery of the academic content when compared to coeducational classes. Secondly, while trying to understand the phenomenon of learning in a single-sex classroom, the researcher tried to determine which specific instructional strategies are considered most beneficial by male and female students. The researcher also looked for evidence of differences in achievement between students in single-sex and coeducational environments. Data collection occurred primarily through surveys, interviews, focus groups, and classroom observation over the course of eight weeks. The general perceptions fifth grade males and females have of learning in the single-sex environment were analyzed through descriptive statistics while qualitative methods were used to garner which gender-specific strategies are being used and the perceived benefit the students have of these strategies.

The first and second guiding questions regarding the use of gender-specific instructional strategies were primarily addressed through qualitative and quantitative methods. The researcher observed a single-sex males' class, a single-sex females' class, and two coeducational classes each in two South Carolina elementary schools for the presence and/or absence of gender-specific strategies. The third guiding question regarding student perceptions of the single-sex classroom experiences was addressed

through survey, interviews, and focus groups. A survey was administered to 38 males and 44 females enrolled in single-sex classes to find their perceptions on the benefit of gender-specific strategies on their learning. Qualitatively, eight male students and eight female students were selected to participate in in-depth interviews and focus groups that resulted in the phenomenological case study. Criterion sampling was used in selecting the students to participate in order to obtain an understanding of student perceptions within the single-sex environment. The method of research allowed the researcher to understand which instructional strategies are perceived as beneficial to learning in the single-sex classroom.

The fourth guiding question regarding student achievement was addressed through quantitative methods. Measures of Academic Progress (MAP) data in reading and math was used to compare achievement of the students in single-sex classes with the achievement of the students in coeducational classes in the two schools. Specifically, the researcher looked for the percentage of students meeting their academic growth targets.

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Chapter 1

Introduction

National and state data exist regarding the achievement gap between males and females in mathematics and reading. Chadwell (2010) notes that in 48% of the states, females outperform males in reading in the elementary and middle grades. High school females outperform males in reading in 45% of the states, and in 18% of the states, elementary school females perform better in math than do males. For females at the middle and high school levels, 23% and 26% respectively outperform males (Chadwell, 2010).

America's public schools are under attack for failing to provide academic rigor, to engage students in meaningful work, and to decrease the achievement gap. Lawmakers in many states have pushed for alternatives to the current grade segregated, coeducational model of education in schools. School choice and alternative programming are sometimes presented as means to improve academic performance. Single-sex education is one of many alternative programming options now available.

Education professionals sit on both sides of the debate regarding single-sex education. Proponents of single-sex education believe classes with only girls support their academic performance. Proponents also contend biologically brain-based differences between males and females need to be addressed by differentiating instruction for the sexes. Opponents of single-sex education report differences between male and female students are trivial and single-sex classes significantly reduce opportunities for

cross contact between the sexes (Hayes et al., 2011). Proponents believe single-sex classes will help males and females overcome discrepancies in achievement. Opponents contend the classes lead to bias and increased gender based stereotyping. Bracey (2007) maintains there is not enough information on this topic to provide appropriate guidance to educators.

Research supports the idea that single-sex classes provide strategies and solutions for helping students achieve at higher levels (Cavanaugh & Mollen, 2001; Sax, 2005; Whitlock, 2006). Research from the National Association for Single Sex Public Education (NASSPE) reveals the single-sex class model is effective in improving males' achievement in language skills as well as females' performance in math and science (NASSPE, 2008). The research also provides evidence that the single-sex classroom fosters positive results in all areas of student achievement (NASSPE, 2008).

Stotsky (2012) conducted a study of two Arkansas public elementary schools with single-sex classes. Each school had single-sex male and female classes and coeducational classes. One school employed a model of self-contained single-sex and coeducational classes whereas the other used a departmentalized model. In the school with the self-contained model, students in all three classes made academic gains although the coeducational class students did not gain as much as students in the single-sex classes. In the school using the departmentalized model, there was no difference in the academic achievement between the boys in the coeducational class and the boys in the single-sex class. Stotksy (2012) found teachers, principals, and parents agreed that the single-sex classes provided fewer distractions, a better learning environment, and greater leadership opportunities for both males and females.

Hubbard and Datnow (2005) conclude other factors within single-sex schools help improve student achievement. A study of California's single-sex academies found separating students by gender alone would not improve student achievement. The school's organizational structure, sufficient resources, and positive teacher-student relationships had more impact on student achievement than did separating students by gender. Separating the students by sex; having appropriate funding from the state; and caring teachers and staff helped to foster success in the single-sex environment. Teachers and administrators worked to obtain resources to support the single-sex environment and the nontraditional curriculum. The school staff also was open to conversations on topics of practical interest to the students and not only academic topics (Hubbard and Datnow 2005).

Bracey (2007) indicates many studies focused on single-sex education are weak and fail to control for socioeconomic status, religious values, prior achievement, and ethnicity. Research is further hampered by small numbers of single-sex schools in the United States to study and compare. Advocates find the schools beneficial, but the research does not conclude single-sex schools are harmful to students' achievement or that coeducational settings are better places for students to learn (Bracey, 2007).

The research on the effectiveness of single-sex education is mixed, and there is merit in both single-sex and coeducational classes and schools. There is mixed data on the positive aspects of single-sex classes and schools, but there is little data on the presence of effective practices in single-sex classes that improve learning for males and females. Schools may segregate students based on sex, but there is not extensive data on what instructional strategies are implemented in these single-sex classes. Best practice in

curriculum delivery would be served well if researchers continue to study single-sex programs in various settings and with diverse students to determine effectiveness.

In South Carolina, as of August, 2012, Katie Golfus of the South Carolina State Department Office of School Transformation reported that(Katie Golfus, personal communication) there were 70 schools offering some form of single-gender programming at various grade levels. Of these schools, 36 were elementary; 29 were middle schools; and five were high schools. Regulations for implementation of single-sex classes require schools determine an area of concern or weakness in student achievement to address through the separation of the sexes. A review of performance data must be conducted every two years to determine if the specific achievement concerns have been addressed and if the practice of single-sex classes should continue. Factors including a decline in student performance in a particular grade or subject and issues that impact the school environment are considered when implementing single-sex programs.

Historical and Legal Framework

Prior to the 19th century, single-sex education was common in the United States (Bracey, 2007). The curriculum was formed by the community's views of the necessary knowledge based on the gender of the student. Typically males were more educated than females to prepare them for college-level academics and work beyond the home. Girls were educated informally in the home (Bracey, 2006a). The end of the 19th century brought males and females together in the classroom primarily to save money (Bracey, 2006a). By the 20th century, coeducational classes were prevalent, not out of moral expediency but out of societal changes calling for females being prepared to work outside the home (Bracey, 2006a).

By the early 1970s, single-sex schools were no longer present in the public school systems due to civil rights legislation that provided equal educational opportunities for all (Bracey, 2007). A 1996 Supreme Court ruling requiring Virginia Military Institute to accept women devised narrow parameters for allowing single-sex classes (Bracey, 2006a). Single-sex classes and schools are now a proposed solution to disparities in achievement between males and females (Bracey, 2007).

Provisions of the No Child Left Behind Act of 2001 (NCLB) have offered parents more choice in providing the best educational opportunities for their children. In 1997, Governor Pete Wilson of California signed legislation permitting single-sex classes in the state's public schools. In 2002, Dr. Leonard Sax founded the NASSPE with a mission to promote the benefits of single-sex classes and to provide research in practices targeting gender differences and gender equality. In October 2006, federal regulations were established that made single-sex education legal throughout the United States. In 2011, South Carolina had 55 school districts, 124 schools, and 19,000 students participating in South Carolina's single-gender initiative (Chadwell, 2011). According to Katie Golfus (personal communication) as of August of 2012, the number of schools in South Carolina with single-sex programs had declined to 70 primarily due to decreases in state level support to schools with single-sex education programs.

Statement of the Problem

NCLB expectations regarding academic gains and pressures to close the achievement gap between male and female students cause schools to seek innovative ways to increase student achievement. Single-sex classes are one method used to confront

the achievement gap. South Carolina's single-sex programs have varied plans for implementation and program components. In short, no two single-sex programs are equal.

In *A Gendered Choice* (Chadwell, p. 2, 2010) the concept of single-gender education is defined.

> Single-gender education occurs when boys and girls are taught in separate classes during some or all of the school day. This can be a single-sex campus: an all–boy school or an all-girl school. This could also be a "dual academy": a coeducational school where boys and girls are in single-sex classes for the entire day. The other form of single-gender involves a coeducational school with single-sex classes held during part of the day.

Single-sex schools have different configurations of program delivery. Included are whole schools or dual academies with single-sex classes. In other schools, single-sex classes are implemented in the core academic classes while still others implement the program in related arts classes. In looking at the various methods of implementation, the researcher questions whether all schools with single-sex programs are consistently implementing best practices for single-sex education or if single-sex classes are conducted much like coeducational classes in their management and curriculum delivery.

Significance

Educational leaders search for innovative practices to increase student achievement. All schools have a mission to educate students and prepare them to become productive members of the community. Focused on this mission, improving student achievement is a principal goal. This research is significant to school and district leaders because traditional methods of instruction do not always produce high levels of engagement for 21st century students or yield the student achievement results needed to meet governmental demands for student growth. Males and females have different learning and behavioral orientations (Martino & Kehler, 2006), and these differences

prompt researchers to think one possible solution to improving the achievement gap is separating students by sex.

Creating a classroom environment in which students achieve at high levels is essential in preparing students for their next steps in education or in their careers. Studies (Cavanaugh & Mollen, 2001; Sax, 2005; Taylor, 2002; and Whitlock 2006) reveal students in single-sex classes achieve at higher levels than students of the same age in coeducational classes. The researcher attempted to uncover best practices in single-sex education; to look at data to determine if teachers adjust the instruction based on whether they are teaching single-sex or coeducational classes; and to determine if there are instructional practices that males and females feel are beneficial to their learning and achievement.

While much of the current data on single-sex classrooms is geared toward middle and high schools, this research is focused on single-sex classes in elementary schools. The researcher looked at data in two elementary schools in South Carolina. Both schools have single-sex classes in fifth grade, however, one of the schools has only fourth and fifth grades with single-sex classes in both grade levels.

Purpose of Study

Most schools in the United States segregate students by age. There are some exceptions in the case of multi-age groupings. Leonard Sax of the NASSPE reports there are significant differences in the ways that males and females of the same age learn. Sax (2006) and Slocumb (2004) report differences in language development between males and females of the same age may put boys at an academic disadvantage when placed with girls of their same age.

Chadwell (2011) provides data demonstrating differences between males and females regarding vision, hearing, information processing, stress, and risk-taking. In single-sex classrooms, teachers instruct students based on state curriculum standards and in some cases the Common Core State Standards (CCSS) while differentiating classroom management and content delivery to address gender differences in learning styles. The research questions of this study are:

1. Is there evidence that teachers adjust the instructional delivery based on whether they are teaching single-sex classes or coeducational classes?
2. What gender-specific instructional strategies are being implemented in elementary schools with fifth grade single-sex classes?
3. What gender-specific instructional strategies do fifth grade students in single-sex classes perceive as beneficial to their learning?
4. Is there evidence that males and females achieve at higher levels when separated by gender than when in coeducational classroom environments?

To most effectively address the research questions raised in this study, case study was used. A phenomenological case study allowed the researcher to understand the instructional strategies taking place in both single-sex and coeducational classes and determine if the instructional delivery is different in single-sex classes compared with coeducational classes. The case study model enabled the researcher to determine student perspectives on the single-sex classroom experience.

The researcher observed the single-sex and coeducational classes in two elementary schools. While observing, the researcher looked for the presence of gender-specific instructional strategies and management practices to ascertain if there are differences in instructional delivery between the single-sex and coeducational environments. The

researcher attempted to determine if the single-sex teachers differentiate instructional delivery based on the research regarding gender-specific strategies. Students in the classes took a survey to determine their perspective on the single-sex experience and which gender-specific instructional strategies are best suited to their learning.

Through criteria sampling, eight male students and eight female students from the single-sex classes were selected to participate in a case study. Students of varying ethnic, social, and academic characteristics were chosen to represent the general student populations of Calm Brook Elementary and Clear Heights Elementary Schools. Student selection was based on achievement data, teacher recommendation, and race. Through interviews, each student spoke of individual perceptions of learning in the single-sex classroom. Focus group sessions were conducted to gain further insight into the students' perceptions of single-sex classrooms. Pseudonyms were used for the schools, teachers, and students to protect their identities.

Limitations and Subjectivities

There are several limitations in narrowing the focus of the study. The context the research is within only two South Carolina elementary schools. Schools, even if they are within the same school district, have a particular culture that is different from another (Barth, 2002). Consequently it cannot be assumed the results found in one particular school or setting will be the same compared to another school. Each school's demographic composition classes observed will also impact the study. It is unknown if similar results would be revealed within a class of a different demography.

Another possible limitation is the bias the researcher holds. Concerns regarding students and their school experiences could also describe the researcher's personal experiences. As the mother of both a male child and a female child, frustration comes when the instructional delivery does not meet each child's learning styles. In helping with homework, much time is spent re-teaching content learned incorrectly.

For the research to be valid and reliable, reflections were recorded to ensure the findings were not skewed by researcher subjectivities. Building rapport with the subjects provided for authentic responses during interviews and focus groups. Findings of the research were shared with the subjects as a means of peer review in order to substantiate the results of the study. Intentional conversations with colleagues allowed the researcher to monitor subjectivities.

Definition of Terms

Achievement: The level at which a student performs on an assessment.

Adequate Yearly Progress: Measurement enacted under NCLB which provides guidance for how the United States Department of Education determines whether a public school is performing at acceptable levels based on standardized test data.

Annual School Report Card: Issued annually, the Annual School Report Card provides a rating of a school's achievement compared to similar schools in the state of South Carolina. A rating of Excellent is the highest possible rating.

Boy-Friendly Instructional Strategies: This term describes any instructional practice targeting the needs and interests of boys. For example, boys are more likely to respond to short tasks rather than longer open-ended tasks. (Martino & Kehler, 2006; Mulholland, Hansen, & Kaminski, 2004). Additional boy-friendly strategies include the

use of manipulatives for learning or allowing boys to choose a humorous topic for writing (King & Gurian, 2006; Martino & Kehler, 2006).

Coeducational classrooms: Method for organizing public schools where male and female students are grouped together heterogeneously.

Engagement: A practice of incorporating attention, interest, investment, and effort put forth by students during learning.

Gender: A process of assigning difference and meaning. Gender is the process by which socially constructed behavior patterns are deemed appropriate for males or females in a society (Ginsberg, Shapiro, & Brown 2004).

Girl-Friendly Instructional Strategies: This term describes any instructional practice specifically targeting the needs and interests of girls. For example, girls prefer to have class discussions in pairs or small groups (Chadwell, 2010). Another example is the use of journaling to allow girls to connect real life events with reading from novels (Gurian, Stevens and Daniels, 2009).

Measures of Academic Progress: A computerized test used to measure student achievement in core academic subjects. Abbreviated as MAP.

Pedagogy/Pedagogical Strategies: The practice of teaching. The teaching strategies used in instruction. (Younger and Warrington, 2006b).

PASS: The Palmetto Assessment of State Standards (PASS) is a test of reading, writing, mathematics, science, and social studies achievement administered to students in grades 3-8 in South Carolina.

No Child Left Behind Act of 2001: Federal law signed by President George W. Bush to close the achievement gap for minority and poor students. This legislation is also referred to as NCLB.

Rasch Unit: Abbreviated as RIT, a Rasch Unit is a model used to analyze categorical data. On the MAP, student scores are reported as RIT scores.

Single-gender classrooms, single-sex classrooms: Homogeneous grouping based on sex. These words are used interchangeably in this research and describe schools having classrooms separated by gender, but could also have coeducational classes on the same campus. Single-gender and -sex classrooms have heterogeneous academic ability groupings. Programs can include academic core content classes, elective classes, after school enrichment programs, and extracurricular clubs. Although gender is considered a social construct, in the case of this study, single-gender means having only male or only females in setting.

Title IX: Title IX supports gender equity in federal educational programs. Title IX states, "No person in the United States shall, on the basis of sex, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any educational program or activity receiving Federal financial assistance." (National Center for Educational Statistics, 2009)

Traditional classrooms: Classrooms where male and female students are grouped together heterogeneously.

Organization of the Dissertation

This study is organized into five chapters. Chapter 1 includes an introduction of the concept of single-sex education and provides demographic information about single-

gender programs in South Carolina. The statement of the problem, legal and historical considerations, significance of the study, research design, delimitations, and definitions of terms are included in the first chapter. Research questions are also presented in chapter 1. Chapter 2 presents a literature review of studies concerning benefits of single-sex education, gender-specific strategies in single-sex education, and a historical overview of education in the United States. In chapter 3 the methodology is presented. Chapter 4 presents the data collected, and Chapter 5 provides the analysis of the data. Chapter 5 also includes recommendations for the schools, recommendations for future study, and implications of single-sex classrooms on the achievement of elementary students. While every school and district are different, some of the recommendations for the participating schools may be helpful to other schools with single-sex programs or schools considering the implementation of a single-sex program. Appendices and references follow chapter 5.

Summary

In Chapter 1, the value of single-sex education found in research regarding its effect on student achievement in public school was reviewed. There is research on single-sex classes and schools in socioeconomically disadvantaged settings as well as in middle and high schools. This research is mixed regarding the effectiveness of these classes and schools. The rationale and significance focuses on single-sex classes concerning gender-specific strategies in the instructional delivery. Uncovering the use of gender-specific strategies and their perceived benefit; determining if classroom instruction in single-sex classes differs from instruction in coeducational classes; and

determining if there are differences in the achievement levels of students in single-sex classes as compared to coeducational classes are the focus of this study.

Chapter 2

Literature Review

Introduction

From schooling at home during slavery to the current plethora of educational opportunities for students, education in America has evolved throughout the country's history. In 2006, the amendment to education law granting single-sex classes in public schools (Smith, 2011) began a revitalized interest in the concept. With over 500 single-sex schools in the United States, much of the interest can be explained because of the achievement gap between males and females (Smith, 2011).

South Carolina leads the way in single-sex education (Adcox 2007). Former South Carolina Superintendent of Education, Jim Rex viewed single-sex schools as an integral part of the state's public school choice initiative (Rex, 2007). Rex believed that without gender stereotypes, students would feel less pressure to conform to societal expectations of feminine or masculine traits and would feel comfortable exploring instructional interests they would not normally (Rex, 2007). In 2009, 215 schools in South Carolina had single-sex programs with David Chadwell being the nation's first statewide coordinator of single-sex education (Adcox, 2007).

From the 1700s to present, the structure of the educational system in the United States has seen significant changes. In the 1700s the process of schooling was carried out in one-room schoolhouses (Smith, 2011). Children of all ages were educated together,

and most students were males. School teachers were viewed mainly as disciplinarians who enforced strict obedience of the rules and carried out a mission to mold students into citizens with good character. There was little educator training during the 18th century, with educators mainly being able to read, write, and perform basic math computations. The curriculum focused heavily on Biblical teachings and helping students learn good character (Smith, 2011).

After gaining independence from England, America's education focus shifted (Smith, 2011). Developing a sense of patriotism and preparing students for the agrarian economy were the main purposes of school. Between 1820 and 1860, Horace Mann's Common School Movement was prominent in educational reform. The idea of the Common School was one of putting schools on common ground for the wealthy and for those unable to afford private schools. Funded through property taxes, the Common School brought a focus on teacher training, mandatory attendance, and provisions for educating females (Kaestle, 2008).

In the 20th century, education reforms such as provisions for females, minorities, and students with disabilities became common place. Both the Civil Rights and Women's Liberation movements provided equal opportunities for all students (Smith 2011). The enactment of the Title IV Education Amendments of 1972, prohibiting sex discrimination for federally funded educational entities was another sweeping change (U. S. Department of Labor, 1972). In the 1980s, gender equity received increased focus as more women in the workforce highlighted the need for equal educational opportunities for males and females (Smith 2011).

Continued changes in the educational system have occurred over the past few years. One of the most significant was the 2006 update to Title IX which provides parents with more options in public schooling including single-sex programs. The regulations allow for single-sex classrooms, schools, and extracurricular programs that must be voluntary in nature and designed to improve a particular deficiency (Smith 2011).

Single-Sex Classes and Schools

Prior to 2006, Title IX only provided for single-sex options in areas such as physical education classes and sex education programming (Smith 2011). However, the often publicized achievement gap and increased accountability for student achievement force educators to seek innovative methods to increase student achievement. Recent studies in curriculum delivery reveal there are significant differences in the ways males and females learn and interact in a classroom setting. A 2000 study at Virginia Tech observed the brain development of 508 students. Included were 224 girls and 285 boys aged two months to 16 years. The researchers found significant differences in the speed at which the female brain matures as compared to the male brain (Hanlon, Thatcher, & Cline, 1999). Work at the National Institutes of Health (NIH) in Bethesda, Maryland also revealed the different regions of the brain develop in a different sequence in males than in females. At age 11, there isn't much difference in the physical size of boys and girls, but there is a significant difference in the trajectories of brain development (Lenroot et al., 2007). In *Boys Adrift*, Sax (2007a) reports a failure to address differences in how males and females learn actually served to highlight gender stereotypes.

Some data indicate the implementation of single-sex classes may positively impact the achievement of males and lessen the gender gap (Lenroot et al., 2007; Sax 2007a; Gibb, Ferguson, & Horwood, 2008). Lawmakers in most states have pushed for alternatives to the grade segregated, coeducational delivery model with school choice seen as one possible way to affect positive change in school performance. In October 2006, federal regulations were set forth making single-sex education legal throughout the United States.

Gurian et al. (2009) report that single-sex classes are successful in teaching both males and females and promoting gender equality. As the numbers increase, single-sex classes are seen as an alternative method for improving academic performance. Through gender-specific strategies, educators can address the challenges present for males and females in hopes of making their educational and social experiences in school more successful (Gurian et al., 2009).

Not all studies have revealed superior effects of single-sex public education over coeducational. Signorella, Frieze, and Hershey (1996) studied an all-girls school as it transitioned into a coeducational campus. Focusing on gender stereotyping in both the single-sex and coeducational settings, the researchers found all students were less stereotyped at the end of the school year than at the beginning. These results challenged the notion that single-sex education is better than coeducational.

Further challenging the notion of single-sex schools, Gilson (1999) compared all-female and coeducational middle schools. In looking primarily at math achievement and attitudes of eighth-grade females within the schools, the data revealed no significant differences in mathematics achievement and attitudes between the all-female and

coeducational environments. Further research (Baker and Jacobs, 1999; Gilson 1999) found girls and boys in single-sex education were not successful because teachers did not implement appropriate pedagogical changes and gender-specific strategies. Gilson stated, "Good educational practice is not limited to a specific school," (1999, p. 9). Schools of various formats are capable of producing effective teaching and learning if the right curricular and pedagogical implements are present (Baker and Jacobs, 1999; Gilson 1999).

Studies on Single-Sex Education

Brain Differences

In differentiating instruction based on sex, researchers study differences in the male and female brain. Data reveal there are differences in how boys and girls receive and process information in the brain. The female brain has a larger hippocampus and stronger neural connections (Gurian and Stevens, 2004). With the male brain having less serotonin and oxytocin, male students' impulsivity and the ability to sit still for long periods of time are impacted. Having a larger hippocampus allows females to have fewer attention issues than male students. The prefrontal cortex in the female brain is more developed than in the male brain which limits females' impulsive behavior. Female students also have a greater ability to use details in speaking and writing, and enhanced verbal skills as a result of the larger hippocampus and stronger neural connectors than males (Baron-Cohen, 2003; Gurian and Stevens, 2004; Halpern et al., 2007).

Neurologically, male and female brains approach learning from different viewpoints. In the primary years, girls' left hemisphere gives them strengths in spoken and written communication which leads to success in reading, writing and speaking tasks.

Girls also have stronger neural connectors which allow them to write and communicate in greater detail than boys (Gurian and Stevens, 2004). The male brain has advantage in recall of facts and categorization of information. Girls have a larger corpus callosum than boys. The corpus callosum connects the hemispheres of the brain which allow for more cross talk between hemispheres of the brain (Gurian and Stevens, 2004).

The right hemisphere of the female brain allows girls express their emotions in a healthy manner and helps them display empathy (Gurian and Stevens, 2004). Female students do not struggle with showing their sensitive side. Academically, with the male brain's right hemisphere having strengths in the visual-spatial and fine-motor arenas, boys naturally excel in math, science, and geography (Connell & Gunzelmann, 2006; James, 2009).

Many of the cortical areas of the brain used for verbal and emotive functioning do not stimulate as many areas in the female brain as it does in the male brain. Such functioning impacts abstract and physical-spatial functions including watching objects that move through physical space and understanding mechanical concepts. Girls often experience anxiety with concepts such as computer design language. Often more males than females will be attracted to subjects such as physics and architecture (Gurian and Stevens, 2004). King, Gurian, and Stevens, (2010) found girls struggle with engagement and learning in science. The research also found that girls have issues with relational aggression and problems with self-esteem as adolescents (King et al., 2010).

Based on the idea of hemispheric differences, girls may find it difficult to relate to a lesson beginning with a video whereas boys may not do well with a lesson situated in

reading material or listening to lecture. Neither approach is inherently damaging, however, each is better for one sex and not the other. The challenge to all educators is providing instruction that meets the needs of each sex.

The male brain has less serotonin and oxytocin than the female brain, making males more physically impulsive than females. The male student is less likely to be able to suppress his impulsive tendencies and sit still or resist talking or playing with a friend (Gurian and Stevens, 2004). Boys are able to lateralize brain activity. The male brain operates with less blood flow than does the female brain and is able to compartmentalize learning. Consequently, females are able to multitask and transition well (Gurian and Stevens, 2004). King et al. (2010), found boys struggle with homework and have lower grades than girls in most classes except math and science. The study also pointed to boys having less motivation to learning and feeling that the academic curriculum is irrelevant (King et al., 2010).

The male brain has a natural mechanism to help it renew and recharge called a state of rest (Gurian and Stevens, 2004; de Munck et al., 2008). The male who sits in class and falls asleep while reading or taking notes and taps his pencil trying to stay awake is in this rest state. Females are able to recharge without a rest state. A female student can be bored in class, but can keep her eyes open and complete the required assignments (Gurian and Stevens, 2004).

The differences in brain development impact student achievement. In looking at brain development, (Gurian and Stevens, 2004) have found differences in male and female achievement hold true across industrialized nations. Research from the

Organization for Economic Cooperation and Development cites a three-year study of 35 countries including the United States, Canada, Japan and European countries where girls outperformed boys in every country. Reading and writing scores most negatively impacted male achievement. Boys lag behind girls in reading achievement by greater than ten percentage points in some states (Gurian and Stevens, 2004; Chudowsky and Chudowsky, 2010). The researchers found the achievement gap between males and females in math and science was narrowed due to using more verbal functioning activities with females (Gurian and Stevens, 2004).

Educators need continued professional development on brain differences. Professional development will help educators recognize these differences and use the knowledge to positively impact achievement rather than reinforce gender stereotypes.

Single-Sex Education and Coeducation

While researchers report gender differences in how the human brain functions, there are also a myriad of studies which reflect variance in achievement between males and females. Literature on the disparity in achievement between males and females will be reviewed. Findings on the benefits of single-sex education and coeducation will be presented.

Much of the disparity in achievement reflects a disadvantage for boys. Despite improvements in classroom technology, innovative curriculum, and large amounts of money, there is still evidence of a widening achievement gap (Harris and Harrington, 2006). Schools are held responsible for this achievement gap in spite of many disadvantages being a result of factors outside of school. Berliner (2009) states the

achievement gap will never be bridged until our nation's public policy effects remedies for these factors.

Many researchers advocate single-sex schools as a means to teach boys and girls using appropriate strategies for their brain-based differences and to help improve the gender gap. Sax (2005, 2007b) found males and females possess many brain differences that are best served through single-sex schooling options. Further, Sax (2008) contends single-sex schooling is the most appropriate way to address these gender differences without putting either males or females at a disadvantage.

Studies on the effectiveness of single-sex schools provide varied results in achievement based on the gender of the students. Mael (1998) divides the research on the case for single-sex education into those that espouse benefits for all students, the cases claiming benefits for females, and the cases claiming benefits for males.

Results regarding benefits of single-sex schools for females and males are mixed. Single-sex high schools are seen immune to the prevalent dating culture by being viewed as more serious school environments (Finn, 1980; Koepke, 1991; Lee & Bryk, 1986). Religious groups (Riordan, 1990) advocate for single-sex schools because they strongly believe in the spiritual and moral education provided in that setting.

Other work cites the academic benefits of single-sex schools for males and females. In a 2007 study, Malcova researched the effects of attending a single-sex school on students in Great Britain. After controlling for prior attainment, Malcova concluded single-sex schools benefitted both males and females, with females benefitting slightly more than males.

Marsh (1989) used data from Lee and Bryk's (1986) work on educational achievement and single-sex and to look at achievement. In this research, Marsh discovered that after controlling for prior attainment and background indicators, there was no significant difference in the size of the achievement gap in reading, writing, mathematics, or science between the sexes at both the single-sex and coeducational schools.

LePore and Warren (1997) reviewed impact of single-sex schools on the achievement gap. No significant differences on the size of the gender gap between single-sex and coeducational settings were found. Like LePore and Warren (1997), Wong, Lam, and Ho, (2002), conducted an achievement gap study using data from high schools in Hong Kong. In reviewing results from end of high school exams in Chinese, English, and mathematics, the researchers found single-sex schools produced different results for males and females. In all three exams, male students performed better in coeducational settings, and females performed better in single-sex schools. However, these results suggest that the gender gap in educational achievement is small in coeducational settings (Wong et al., 2002). While most studies compare the impact of the achievement gap between students in coeducational and single-sex opportunities, Marsh et al. (1998) approached the concept of the gender gap in schools transitioning from being single-sex to coeducational. The results concluded there was no significant change in the size of the achievement gap after the switch to a coeducational model (Marsh et al., 1998).

While some research advocates single-sex schooling for all children with mixed benefits depending on the gender, other research cites the benefits of single-sex schooling for females. Mael (1998) cites those who believe single-sex education can assuage

sexism (Hansot & Tyack, 1990) and those who believe single-sex schools help alleviate gender inequity (Bailey, 1993). Other researchers including Finn (1980) Lee and Bryk (1986) claim direct academic benefits of single-sex schooling for female students. The literature to follow will focus on the benefits of single-sex schools for females.

Gibb et al. (2008) found that at traditional or coeducational schools, there was a statistically significant achievement gap in favor of female students. Lee and Bryk (1986) looked at scores in reading, mathematics, science, and writing. The students in the single-sex schools had better scores than the students in the coeducational schools, but achievement in the single-sex schools was greater for females than for males. However, Lee and Bryk's study has been criticized for failing to control for prior school achievement (Marsh, 1989).

Van de Gaer, Pustjens, Van Damme, and De Munter (2004) reviewed achievement of Belgian high school students in math and language. After making allowances for the selection process, the researchers found single-sex education had no significant impact on achievement for males, but had a positive effect on mathematic achievement for females (Van de Gaer et al., 2004).

Herr and Arms (2002) studied an urban middle school where males and females were on the same campus but were separated for core classes and found single-sex classes worked well for girls, but discipline and classroom behavior were problematic in the all-male classrooms. Educators did not change their pedagogy in order to achieve gender equity and meet gender-specific needs. Herr and Arms (2002) found face-to-face interactions, keeping eye contact, smiling, arranging chairs in circles, and focusing on

real world mathematical applications are appropriate strategies for females. Strategies for males include shoulder-to-shoulder interaction and movement.

Additional studies reveal the benefits of single-sex education for males. Hudley, Graham, and Taylor (1998) studied a self-contained classroom of African-American male adolescents who were taught by an African-American male. The results revealed the presence of a strict adherence to classroom discipline policies, strong positive relationships among students and teachers, high teacher support, better academic performance and better attention to task in the single-sex male classroom.

Hudley et al., (1998) suggested cooperative leadership, the all-male environment, a consistent behavior management system, and specific strategies for meeting the learning needs of adolescent males may have helped increase the test scores The focus is on relationships, classroom management, and adjusting the pedagogy to help increase student achievement.

Lee and Marks (1990) and Gibb et al. (2008) found the single-sex environments provided a non-significant gap in favor of male students. Gibb et al., (2008) adjusted for a series of covariates related to school choices and found there were significant differences between single-sex and traditional schools in the size and direction of the gender gap. Lee and Marks (1990) looked at single-sex schooling using Scholastic Aptitude Test (SAT) scores in the United States. Male students who attended single-sex schools showed higher math scores than those males who attended the coeducational schools. On the verbal part of the test, males in single-sex and coeducational schools

showed similar achievement levels. However, females in the single-sex schools showed higher verbal scores than did the females in the coeducational programs.

While some of the studies on the benefits of single-sex schooling did not discuss the gender-specific strategies used, other studies do cite the presence of specific strategies used intentionally. In the review of the literature on the benefits of single-sex education, information is provided on teacher training and the classroom pedagogy. The information that follows will highlight the need for appropriate teacher training. The impact of adjusting the curricular delivery on achievement and gender equity will be reviewed.

Gibb et al. (2008) reviewed factors leading to the decrease in the achievement gap in the single-sex environments. The authors theorize the single-sex environment allows teachers to tailor instruction to the specific needs of males or females. This theory gives credence to the findings of Sax (2005) which state the traditional model of school caters more to the learning styles of female students. Warrington and Younger (2005) propose single-sex schools allow boys to persist and achieve in their school work without appearing to be feminine in front of the opposite sex. The need for increased teacher training in practices to tailor instruction for males or females in either setting is evident. Whether in single-sex or coeducational settings, the authors found all schools should assess organizational practices in the classroom and in extracurricular opportunities to reduce gender bias and help male and female students achieve at high levels (Gibb et al., 2008).

As a part of Governor Pete Wilson's 1996 legislation, grants were established to implement single-sex academies. These grants started six male and six female schools. Hubbard and Datnow (2005) interviewed over 200 teachers and students in these academies. In the single-sex schools, the majority of teachers did not fine tune the instruction to meet the needs of particular groups. While some teachers reported selecting varied reading materials for males and females, few curricular and teaching modifications were implemented. Some teachers used physical punishment and boot-camp types of discipline.

Baker, Riordan, and Schaub (1995) examined a middle school with a large minority population, and asserted that teachers found girls more enjoyable to teach and had fewer discipline problems in classes with girls. The teachers believed females worked better in groups and participated more in class discussions. The research found teachers failed to customize instruction for the learners—male and female—and consequently failed to achieve equity in student achievement.

While there are researchers who advocate for single-sex schools, others claim coeducation is the appropriate approach to schooling. Advocates for coeducation do not claim that coeducation provides superior pedagogy. However, they argue that because coeducational classes and schools are reflective of society, these settings better prepare students for cross-gender interactions in the real world (Harris, 1986). Hansot and Tyack (1988) claim coeducation is a fairer environment because single-sex schools for girls have typically received fewer resources than similar schools for boys. Without the presence of male classmates, female students lower their educational and career

aspirations. These female students gain interest in occupations such as nursing and teaching considered stereotypical for girls (Hansot and Tyack 1988).

Other advocates for coeducation claim coeducational classrooms provide boys with better opportunities for socialization and help curtail behavior issues (Jones & Thompson, 1981). Kenway and Willis (1986) theorize single-sex classes do not allow for opportunities to improve gender equity in school as well as in the workplace. Feminists believe when girls are taught separately from boys, male students retain their sexist attitudes, ideas, and behaviors (Jones & Thompson, 1981). Mael (1998) asserts simply that single-sex education is a more expensive option than coeducation by having to duplicate resources in separate settings and still having to provide a coeducational option.

The evidence isn't conclusive on the benefits or disadvantages of single-sex education. Research (Lee and Bryk, 1986; Lee and Marks, 1990; Gibb et al, 2008) found the single-sex environment to benefit female students. Marsh (1989) and LePore and Warren (1997) found single-sex environments did not have a statistical impact on the achievement gap. Wong et al. (2002) found male students performed better in coeducational settings, while females performed better in single-sex settings. Additional research (Datnow et al., (2001); Herr and Arms (2002); and Baker et al., (2002) reveal the need for advanced teacher training as well as a specific focus on implementing gender-specific strategies in the classroom in order to improve the achievement gap. Research is also needed to determine if single-sex classes and schools are appropriate means for closing the achievement gap or if gender equity can be achieved in coeducational settings using gender-specific strategies.

Factors Impacting the Gender Gap in Achievement

Several theories exist to rationalize boys' underachievement. Factors such as student ability, culture, health and physiological makeup, school design, and social practices are often theorized as contributing to the achievement gap. Literature on the impact of environment on the achievement gap will be reviewed.

Gunzelmann and Connell (2006) question whether boys' school performance is the result of a learning disability, a health concern such as ADHD, low motivation, or the design of the educational system in our country. Teachers, lawmakers, and researchers have attempted to rationalize the gender gap and to make meaning of boys' underachievement in the primary grades (Connolly, 2004, Younger and Warrington 2006a). Several theories--including cultural perceptions, educational perceptions, and neuro-biological differences—are thought to impact males' underachievement.

Many boys conform to societal expectations of masculine behavior. Cultural stereotypes exist which expect boys to engage in macho type behavior which causes barriers to learning to develop (Gunzelmann & Connell, 2006). Conformity to masculine behavior leads males to act in ways that stifle their own achievement (Younger and Warrington, 2006a). Younger and Warrington (2006b) also state boys engage in activities that distance themselves from being considered feminine. Boys perceive working hard and being cooperative as feminine behavior (Younger and Warrington, 2006b).

Gunzelmann and Connell (2006) theorize the structure of school can put male students in jeopardy of underachievement. School climate and expectations put male

students at risk for failure in reading. Boys are often expected not to whine and to be tough outside the classroom and yet sit still, cooperate, and speak only on command inside the classroom. Not being allowed to be themselves and not experiencing academic success often cause boys to feel that they do not measure up to the expectations of school (Gunzelmann and Connell, 2006).

Along with the mixed messages of school expectations for males and females, the curriculum and pedagogical approaches often do not favor male students. Reading assignments in the classroom impact the male student's motivation to read. Girls read from a broad range of genre, but boys tended to prefer nonfiction texts, magazines, and books in a series. Most texts in a classroom are based on educators' views of quality reading materials, and the books are often not the first choice of males because the texts are perceived as being feminine in nature (Merisuo-Storm, 2006).

Further evidence of how classroom assignments impact classroom performance and achievement is provided through the work of Bauerlein and Stotsky. Bauerlein and Stotsky (2005) reveal the English language arts curriculum is slanted toward female students as evidenced by reading assignments having few heroic non-fiction stories. Many pieces of literature with brave and adventurous female heroines exist but very few with heroic males exist. If schools do not incorporate materials that appeal to male students, the trend of academic underachievement for boys will likely continue (Bauerlein and Stotsky, 2005).

Bauerlein and Stotsky (2005) cite a 2004 report, "Trends in Educational Equity of Girls and Women" from the United States Department of Education as further evidence

of the disparity between male and female achievement. This report reveals that between 1992 and 2002, high school senior females showed a decline of two points in reading compared to six points for males. The authors also cited similar results in kindergarten students where girls outperformed males by 0.9 points on a fall literacy assessment. However by the spring semester, girls outperformed boys by 1.6 points on the same assessment (Bauerlein and Stotsky, 2005).

While there is work reflecting poor performance for males in literacy, other research shows strengths for males in mathematics. Male and female students begin elementary school with the same mathematical ability (Gavin & Reis, 2003; Guo & Leahy, 2001; Manning, 1998). By the time students begin middle school, males catch up and outperform females. Alsup and Sprigler (2003) report a decline in mathematics achievement for girls along with higher mathematical reasoning abilities for boys beginning in the middle school year. Guo and Leahy (2001) found the mathematics achievement gap being most pronounced in quantitative reasoning, analytic spatial visualization, mathematical reasoning and geometry.

Our nation's schools may impact the increase in the gender gap. Runk, Leedy, and LaLonde (2003) found teachers respond differently to male and to female students in the classroom. Lichtenstein (1996) revealed teachers tend to respond to males with instructions or directives while being more nurturing to females. Males often participate more than females, and males also tend to receive more praise for answering questions correctly than do females (Miles & Rebhorn, 1999). These differing responses further impact students' feelings in the school setting as well as their achievement.

Along with existing gender stereotypes and the structure of most coeducational school environments, McLaren (2009) points to a "hidden curriculum" in schools which encompasses the organization of the classroom, teaching styles, grading practices, and teacher expectations. Examples of the hidden curriculum include how teachers respond to male students versus female students and biases in how teachers grade work. McLaren (2009) states these factors impact the messages transmitted to students in the classroom, and contribute to gender stereotypes and some of the difficulties students experience in the classroom and in the outside world. The hidden curriculum grants power and privilege to males over females. Examples of this power include females feeling they are not able to be successful in math and science and the achievement gap between males and females on standardized tests. The hidden curriculum can reinforce dominant ideologies and social practices impacting authority, behavior, and morality (McLaren, 2009).

In looking at the hidden curriculum, McLaren (2009) reveals male and female students are disadvantaged in the coeducational classroom.

> "When boys call out comments without raising their hands, teachers generally accept their answers; girls, however, are reprimanded for the same behavior. The hidden message is boys should be academically aggressive while girls should remain composed and passive. In addition, teachers are twice as likely to give male students detailed instruction on how to do things for themselves; with female students, however, teachers are more likely to do the task for them instead. Not surprisingly, the boys are being taught independence and the girls' dependency." (p. 75)

Schools as they are currently structured do not meet the needs of our male students and how we choose to conduct school contributes to this deficiency. School, as it is currently designed, was set up to meet the needs of the Industrial Age and post-secondary work in a factory. During this time, behaviors such as compliance and

structure were encouraged in order to be successful in work and in life. In today's workforce, risk-tasking, creative thinking, and being a self-starter are traits that contribute to one's success (Sadker, 2002). Often males do not exhibit these behaviors, and are left feeling marginalized in the school setting (Draves, 2002). Sadker (2002) points out that when male students do not feel successful, they are apt to become disengaged, misbehave, or drop out of school.

Schools tend to be more left brain friendly places using mainly verbal processing, limiting the availability of free space and movement, and are structured to have specified time periods and stringent rules. Learners who are careful listeners and are typically reserved are the ones who are valued in our schools (Hunsader, 2002; Gurian and Stevens, 2004; King and Gurian, 2006). Characteristics males bring to the classroom such as spatial-kinesthetic learning and impulsivity are not desired (King and Gurian, 2006). With nearly 90% of elementary school teachers being women, teaching and learning in the elementary school are slanted to the female brain's learning style leaving male students behind (King and Gurian, 2006). By differentiating strategies to engage the typical male characteristics, students have a greater chance for achieving academic success. Information from the NASSPE (2008) cites teachers' lack of understanding of gender differences which leads to reinforced gender stereotypes. Understanding the differences between males and females can help alleviate gender stereotypes.

In addition to culture, student ability, health, school design, brain-based differences between males and females, the hidden curriculum, and teacher training and professional development are all factors impacting student success in the classroom. While educators cannot control the brain-based differences, education leaders can tailor

the professional development practices to recognize the differences and account for them in training programs. Educators can also scrutinize the lesson plans, classroom activities, and learning environment to meet student need.

Gender-Specific Strategies in Education

Data on single-sex education is mixed as to whether the practice indeed improves learning for males and females. Whether the school setting is single-sex or a traditional coeducational model, the use of gender-friendly strategies helps improve learning. Many teachers realize the training they received in undergraduate and graduate education programs is designed to teach all students in a verbal and sedentary manner (King et al., 2010). Grouping students by sex is one method of eliminating the distraction of the other sex, but simply grouping students will not automatically bring about improved results in student achievement. Tailoring the instruction to meet student need is necessary (Mulholland et al., 2004; Parsons, 2004).

Teachers in single-sex classes and schools need appropriate professional development in brain-based strategies and instructional practices. Strategies are related to social and emotional needs; sensory experiences, physical structure of the classroom environment, and particular strategies for the content areas. Information on best practices with regard to extra-curricular activities will also be reviewed.

Before teachers can tailor instruction to meet student need, they must engage in the appropriate training to differentiate the instruction based on the student's sex. Sax (2005) found simply separating students by gender would not necessarily produce improved achievement. Professional development for teachers is significant to erasing

gender stereotypes in the school setting (Sax, 2006; Weaver-Hightower, 2003, Peterson and Fennema, 1985). Martino, Mills, & Lingard, (2005) and Gray and Leith (2004) point out the impact of pedagogical teacher training on the instruction in the single-sex classroom. Parker and Rennie (2002) found gender-inclusive strategies such as cooperative teams and problem solving were easier to implement in single-sex classes than in coeducational settings.

In *A Gendered Classroom: Gender Differences and Classroom Implications* (Chadwell, 2010), a review of gender-specific instructional strategies for males and females is provided. Strategies look at how students receive information through sight, hearing, and engagement, as well as how students interact with information through processing, responding, and choosing. Gender-specific strategies for engaging male and female students will be reviewed.

At Wamsley Elementary School in Rifle, Colorado, the principal and teachers looked for methods to help the male students improve their academic learning. In 2007, the school with 50% of students on free lunch and 30% of students classified as English language learners, was on academic watch for not meeting AYP. Females outperformed males significantly. The principal decided to focus school improvement efforts on achieving gender equality. Wamsley's entire faculty attended online professional development and a summer institute on gender-friendly strategies. In the first year of implementing the initiative, student academic performance improved dramatically, and the school was taken off the AYP watch list (King et al., 2010).

While researchers report separating students by sex alone will not lead to automatic higher academic achievement, it is necessary to look at the situations where gender-friendly strategies can be employed. In addition to quality instruction, educators should look at tailoring the social/emotional, sensory, classroom environment, and content delivery methods in order to meet the specific needs of males and females. Appropriate emphasis on extracurricular experiences to meet student needs is also necessary.

Social and Emotional Factors

The social and emotional needs of males and females should factor into the single-sex classroom. Gurian et al. (2009) report single-sex instruction improves classroom learning opportunities by focusing on the challenges and stresses males and females face in school and in their personal lives. Gender-friendly strategies are nontraditional and well suited to differences in how males and females learn. Hanlon et al. (1999) and Gurian et al. (2009) found differences in the speed of brain maturity between males and females impact the social and emotional development of students. Gurian et al. (2009) report the implementation of single-sex classes allows schools to group students who are similar in the stages of brain development and tailor the instruction in light of the different stages. These authors believe the single-sex environment will allow boys to feel more comfortable trying new arts-related and allow girls to try more spatially oriented subjects such as math and science (Gurian et al., 2009).

In the female single-sex classroom, research shows the need for the teacher to pay particular attention to the dynamics of the relationships between girls. While cooperative group work is an important means for the delivery of the content (Chadwell 2010). Gurian et al., (2009) advise that teachers need to be present at the beginning of group work so that one individual doesn't attempt to manipulate others in the group.

Boys are limited by the so-called "boy code," and girls are also limited by the "girl code" (Gurian et al., 2009). Boys are sent subtle messages about how they should behave in a masculine way and only display emotions such as anger, aggression, and competition. The "boy code" doesn't allow males to show their more sensitive side. Likewise, the "girl code" sends messages to girls that they should be people pleasers striving to make others happy. Gurian et al. (2009) reveal single-sex classes allow the opportunity for males and females to express themselves in positive and appropriate ways without ascribing to societal norms of behavior.

Sensory Issues

The five senses impact students' access to the curriculum. Lighting is especially critical for teaching male students. In order for a classroom to be visually stimulating to male students, teachers must create well organized and clutter free spaces. Teachers need pay careful attention to the arrangement of posters and charts in the classroom so the environment doesn't become visually distracting (Gurian et al., 2009).

Sax (2006) reports a female's sense of hearing is much more sensitive than that of a male student. Consequently, Sax advocates teachers in the single-sex female class adjust the tone of voice and volume so they don't unintentionally convey anger to the

female students. Lowering the voice, using fewer direct commands and including more terms of endearment are girl-friendly communication practices in the female classroom (Sax 2006).

Teachers of male students need to be tolerant of noise and boy behavior. Male students tend to have more energy and employ humor—necessitating additional movement and vocalization-- more often than females. The teachers in these settings should accept these factors and use them to their advantage in creating an appropriate learning environment (Gurian et al., 2009).

Movement within the classroom (Chadwell 2010; Gurian et al., 2009; and Sax 2006) helps males students learn. However, incorporating outdoor experiences also helps in fostering the success of males. Sunlight, fresh air, and increased space for movement help improve mood and recharge thinking (Gurian et al., 2009).

Proper hydration is necessary for optimal learning for both males and females, but especially for males. The classroom can sometimes be a stressful place for students. When male students become frustrated with work, cortisol is released in the brain. Drinking water helps relieve stress and promotes mental and physical well-being (Gurian et al., 2009 and Slocumb, 2004).

Classroom Environment

Males and females have differing preferences concerning their social and emotional needs and sensory issues, and they also have different preferences regarding the spaces where learning occurs. Research shows the physical arrangement of the

classroom can impact achievement. The information in this section will look at the specific classroom environment needs of male and female students.

Part of meeting the different needs of male and female students is to look closely at the educational environment. The set up and structure of the room are different when using gender-friendly strategies. In single-sex male classes, physical space is important (Gurian et al., 2009). Having added space in the male classroom can decrease distractions and help improve focus. When boys have more space to work, they are able to work, build, and have increased spatial learning (Chadwell, 2010 and Gurian et al., 2009). Room temperature also plays into the environment in the male classroom as males tend to fall asleep when the room is too warm (Sax, 2006).

Flexible seating options are a gender-friendly strategy in the classroom (Chadwell, 2010 and Gurian et al., 2009). Girls tend to prefer a cozier and quieter environment than do boys. Flexible seating and a variety of seating options are considered gender-friendly for girls. Girls tend to desire cozy areas for reading or creative spaces for writing activities. They also like spaces where they can do center work and projects (Gurian et al., 2009). Chadwell (2010) advocates rotating seating arrangements for girls often and before class begins. These management techniques help to avoid forming cliques and setting the stage for bullying. Boys need the options of being able to choose their work space. Some boys may be more comfortable working while lying on the floor or while standing. Tables are a suitable choice for the male classroom because of the flexibility in being able to easily change the room configuration (Gurian et al., 2009).

Delivery of Academic Content

Strategies such as the appropriate room arrangement, temperature, light, and procedures help establish a well-managed and effective single-sex classroom. A single-sex classroom cannot achieve its intended goals without attention to the physical arrangement. However, educators also need to pay attention to the instructional delivery for males and females.

Strategies exist that tailor instruction to meet the learning needs of females. Gurian et al. (2009) espouses teaching mathematics by connecting it to the spatial part of the brain. Jumping rope, moving to learn multiplication facts, and allowing girls to work math problems on the board are appropriate activities for female students. These researchers also advocate integrating verbal skills such as journals or mnemonic devices in teaching math. Role play can also be a strategy for math as well as science and social studies.

Opportunities for discussion in pairs or small groups in all subject areas play on girls' verbal strengths (Chadwell 2010). Encouraging girls to ask questions and take risks with their learning taps into their brain strengths. Limiting procedural questions and ask questions frequently to help girls clarify their learning and help females feel confident about their ability to learn (Chadwell 2010).

Female students need opportunities where they are allowed to take risks with their learning. Chadwell (2010) advocates providing learning activities incorporating role play so students become comfortable with their knowledge of a subject. Female students need

lessons where the teacher answers questions with questions so they can cement their thinking (Chadwell 2010).

The struggles of male students in reading have been evident for many years. Researchers have found males and females display many differences when learning literacy skills. These researchers cite differences in the biological, behavioral, and preferential make up of boys and girls (Hunsader, 2002; King & Gurian, 2006; Gurian & Stevens, 2006; Martino & Kehler, 2006; Sax, 2007b). Males need books on topics such as history, heroes, and monsters; interesting pictures embedded in the literature; and technology integration in promoting literacy achievement (Gurian et al., 2009). Incorporating pictures and technology in literacy play on males' visual strengths. Female students tend to have stronger verbal skills than males. Consequently, opportunities to write daily and read books of interest help female students' achievement (Gurian et al., 2009; Chadwell, 2010).

Gurian et al. (2009) and Chadwell (2010) both advocate structuring lessons for males so a quick pace is maintained and information is presented in small chunks. Gurian et al. (2009) also advocate talking to boys about the characteristics of the male brain and how the classroom will be set up to help them make the most of the brain strengths. Establishing short-term education goals and setting time limits for completion of work keep males working and focused (Gurian et al., 2009).

Teachers of males should incorporate a variety of active learning strategies such as skits, role play, and investigations (Gurian et al., 2009; Chadwell, 2010). Tapping into a male student's visual and spatial strengths through the use of manipulatives in

mathematics and using hands-on materials in all subjects are two ways to teach toward male strengths (Sax, 2006). Gurian et al. (2009) advise teachers to incorporate project based learning into science and social studies lessons.

Gurian et al. (2009) also reveal teachers need to be willing to make accommodations for the needs of boys through allowing boys to stand as needed or to hold play dough while working. Teachers of males should provide clear instructions for the completion of work preferably in a visual format. Visual examples of acceptable work and a visual plan or schedule for the day are needed to help male students. Teachers of male classes should provide strategies that make transitions easier.

Gurian, Sax, and Chadwell have provided specific strategies for teaching the core content to single-sex classes. These authors are careful to stress that the curriculum standards are not different for males and females. Educators cannot delete topics of study simply because they do not appeal to one sex or the other. Teachers of single-sex classes should differentiate the content and manage the classroom to foster academic success for male and female learners.

Extracurricular Activities

The structure of the classroom and the methods of curriculum delivery help foster the success of males and females in single-sex classes. However, education practitioners need also look at the design of extracurricular opportunities.

Girls need extracurricular experiences that provide them with leadership opportunities. Gurian et al. (2009) advocate talking with girls about current leaders and how they handle their leadership responsibilities as well as sharing examples of how

leaders work together to devise solutions. Classroom lessons should promote social responsibility so girls become more comfortable taking on leadership roles (Gurian et al., 2009).

Along with teaching female students leadership and social responsibility, Gurian et al. (2009) and Chadwell (2010) reveal girls need opportunities to learn how to disagree respectfully. Leadership opportunities can provide females with chances to dialogue and ask questions to better understand a person's point of view. Females also need to learn to disagree with a thought or an idea and not personally attack another female (Gurian et al., 2009).

Girls enjoy competition. Gurian et al. (2009) reveal that because the world is inherently competitive, girls need opportunities to practice competing and being able to accept defeat in a healthy manner. It is critical to see both competition and cooperation in activities (Gurian et al. 2009).

Gurian et al. (2009) reveal girls build connections through relationships, so they need chances to see how the academic content is reflected in their daily lives. For example, girls need extracurricular opportunities such as mentoring programs and service projects to allow them to use the academic content in a real world context. Having female role models present in the single-sex classroom is a girl-friendly strategy. Adult role models in fields of work not traditionally occupied by females allow girls opportunities to see they have the potential to succeed (Gurian et al., 2009).

Gurian et al. (2009) and Sax (2006) promote chances for competition for male students. Having games embedded within a lesson or games to review prior to a test help

recharge mental functioning. Other opportunities for competition such as school-wide food drives or themed competitions increase team spirit and motivation. However, the researchers caution the use of competition with very young males who do not yet understand the concept. Gurian et al. (2009) state acquiring information about the outcome of competition may lead boys to make comparisons between themselves or other groups which is not always healthy. Gurian et al. (2009) advocate using competition in teams that are fluid and alternate members frequently so male students are able to feel success and not always defeat.

Sax (2006) reports incorporating male role models such as having fathers participate in classroom and extracurricular activities, as well as, having male speakers on academic and social topics are critical to the success of male students. Gurian et al. (2009); King & Gurian 2006; and Martino & Kehler 2007 also emphasize having male role models in the school. Having male teachers and principals participate in read-ins or having fathers and male family members speak on educational topics are ways to include male role models in the single-sex setting.

The researchers do not advocate allowing only specific extracurricular activities for males and females in the single-sex setting. Teachers in single-sex classrooms and schools should take care to develop the extracurricular opportunities so they speak to the specific needs of male and female students. While students need extracurricular activities, the activities should be differentiated with their specific needs in mind and not just typical coeducational opportunities that are separate based on the sex of the student (Sax, 2006; Gurian et al., 2009; Chadwell, 2010).

Summary

In Chapter 2, literature surrounding single-sex education was reviewed. Information on the origins of school in the United States with regard to early single-sex schooling opportunities, and current single-sex classes and schools was presented. The chapter also provided a brief review of phenomenology and critical theory as related to a single-sex classroom environment and its' impact on achievement. A review of brain-based differences between male and female students provided the basis for modifying instruction to meet student need. Arguments for and against single-sex schools with regard to the achievement gap were presented. Strategies for developing single-sex classrooms and designing the curriculum were also reviewed in regard to the research questions.

Chapter 3

Methodology

Introduction

Educational researchers and scholars have documented the underachievement of male students in schools (Bauerlein & Stotsky, 2003; Chudowsky & Chudowsky, 2010; Connolly, 2004; Sax, 2007; and Warrington & Younger, 2005). Connell and Gunzelmann (2004) report 75% of the reading achievement gap between boys and girls exists by fourth grade. Three primary factors, the design of our nation's schools, societal expectations and practices, and brain-based differences between males and females contribute to the achievement gap.

Researchers including Draves (2002); Sadker (2002); Slocumb (2004); and Sax (2005) contend that schools in their current design are not effectively meeting the learning needs of male students. The design of most schools promotes the verbal and often sedentary learning preferences of female learners (Draves, 2002; Sadker 2002). Male learners need opportunities to interact with the educational content that considers their specific needs. Boy-friendly strategies (Gurian et al., 2009; Chadwell 2010; Sax 2006; Slocumb, 2004; Connell& Gunzelmann, 2006) such as movement, visual-spatial learning activities, manipulatives, hands-on activities, technology, and literature of interest to boys are ways schools can encourage the achievement of male students.

Attempting to meet the needs of male and female learners, schools across the United States have implemented single-sex programs and classes. Single-sex classes are seen as one means of tailoring instruction to meet specific needs and provide an environment where students do not feel pressured to interact with or impress students of the opposite sex. Mulholland et al. (2004) and Parsons (2004) have found simply separating students by sex will not achieve improved academic achievement. Teachers have to apply appropriate gender-specific strategies to foster achievement.

The purpose of this study was to determine what gender-specific strategies are being implemented in two South Carolina elementary schools with single-sex programs in fifth grade and which of the strategies students perceive as beneficial to their learning. The researcher wanted to determine if educators in single-sex classes and schools indeed adjust the curriculum delivery based on gender-specific practices. To better understand the implementation of single-sex program in elementary schools, the researcher utilized a mixed methods phenomenological case study approach. The study focused on the following research questions:

1. Is there evidence that teachers adjust the instructional delivery based on whether they are teaching single-sex classes or coeducational classes?
2. What gender-specific instructional strategies are being implemented in elementary schools with fifth grade single-sex classes?
3. What gender-specific instructional strategies do fifth grade students in single-sex classes perceive as beneficial to their learning?
4. Is there evidence that males and females achieve at higher levels when separated by gender than when in coeducational classroom environments?

Recent studies have brought an increased awareness of the physiological differences between male and females and their impact on students' academic strengths and preferred learning styles (Gurian & Stevens, 2006; Hunsader 2002 King & Gurian 2006; Martino & Kehler, 2006; Sax 2007). Single-sex education is seen as a means to improve the academic achievement, particularly of males. To better understand how teachers differentiate instruction based on gender-specific practices in single-sex education, a phenomenological case study was conducted. Through interviews and focus groups with eight male and eight female fifth grade students the phenomenon of learning and achievement in a single-sex classroom was examined. The researcher intends the findings of this study will contribute to the body of knowledge regarding the achievement gap and the possible impact of employing gender-friendly strategies on the achievement gap in this country.

Pseudonyms were used for both schools and all participants involved in this study. This practice protects the identities of those involved and the educational system they represent. As well, the use of pseudonyms helps to ensure the data generated is authentic and correct.

Phenomenology

In designing the research, the researcher examined two elementary schools with fifth grade single-sex education programs for the presence of gender-specific strategies in instructional delivery and to determine if there are differences in achievement between students in single-sex and coeducational classes. In looking at the instruction, the researcher looked at differences in content delivery between the single-sex and coeducational classrooms. Phenomenology strives to explain the "essence" or "lived

experiences" of an identified phenomenon for individuals (Creswell 2007 & 2009). "The basic purpose of phenomenology is to reduce individual experiences with a phenomenon to a description of the universal essence. Phenomenology is not only a description, but is also seen as an interpretive process in which the researcher makes an interpretation of the meaning of the lived experiences" (Creswell, 2007, p. 59). The researcher will use phenomenology to "understand how and what meaning they (the males and females) construct around events in their daily lives (i. e. single sex classes)" (Bogdon & Biklen, 1992, p. 34). Specifically, the researcher will be able to understand how differentiating instruction based on sex of the student is socially constructed to influence learning (Merriam, 2002). The theoretical perspective will be used to provide an explanation of learning in single-sex classrooms (Creswell, 2009).

Individuals view the world differently due to the varying experiences and beliefs occurring in daily life. Theory provides a framework for understanding the perceptions a researcher holds, and provides a common language for individuals to understand and explain phenomenon (Glesne, 2006). "Theory is not reality; it is our best shot at describing reality" (Marion, 2002, p. 4). To understand how single-sex classes could possibly bring increased engagement and academic achievement, scholars must understand the previous classroom experiences of boys and girls. When the researcher aligns theory to research, she must remember that many different realities coexist in education settings. Critical theory will be used to attempt to explain the phenomenon of learning in a single-sex classroom.

Critical theory stresses reflective assessment and critique of our society by applying the social sciences. Seeking to distinguish and uncover the beliefs restricting

human potential by allowing people to "transcend the constraints" of class, race, and in this case gender is the basis of critical theory (Creswell, 2009, p. 10; Usher, 1996). Schools experience the same problems and concerns existing within society (McLaren, 2009). Critical theory attempts to provide a glimpse into the incongruity between what society should be and the reality of society (Giroux, 2001). Critical theory is appropriate to address the research questions because critical theory exposes the realities of the achievement gap between males and females, and critical theory helps to give an awareness of the possibilities that exist (Kim & Taylor, 2008). While there is an increased awareness of the phenomenon, researchers will also begin to understand who gains from our current model of instruction and who does not. Historically, schools serve the privileged by helping preserve their elite status. Education practices can be considered advantageous when they contribute to the success of all students, the marginalized and the disenfranchised, not just the elite (Apple, 2004; Freire, 1997; Giroux, 2001). With regard to critical theory, single-sex programs benefit males by breaking a cycle of inequity and leading to increased achievement. (Kim & Taylor, 2008). Female students also find increased opportunities for achievement and leadership in the single-sex programs (Sax, 2006).

Description of the School Community

Calm Brook Elementary School opened in August, 2007, and is located in a school district bordering the state line of the Piedmont region of South Carolina. Southern School District Number Three is comprised of 27 schools: 18 elementary schools, six middle schools, and three high schools. During the 2011-12 school year, the

district had an Average Daily Membership (ADM) of 16,752.97 students. Of the 85 total school districts in the state, Southern School District Number Three had the 15th highest ADM and had the highest ADM in the Southern County.

Clear Heights Intermediate School is located in Rose School District, which is approximately 64 miles west of Southern School District Number Three. Rose School District is comprised of 13 schools: eight elementary schools, three middle schools, and two high schools. During the 2011-12 school year, the district had an Average Daily Membership (ADM) of 9614.19. Of the 85 total school districts in the state, Rose School District had the 69th highest ADM. Rose School District one of seven school districts in its' particular county.

Based on the 2010 national census, the median household income of families in Southern School District Number Three is $51,925 which is higher than the state average of $44,587 and lower than the national average of $52,762.00. Over the past several years, student enrollment within the district has decreased slightly from 17, 717 students in 2010, to 17,218 students in 2012. However, enrollment at Calm Brook has increased from 506 students in 2010 to 564 students in 2012. The student-teacher ratio in core subjects has increased from 19.0 to 1 in 2010, to 20.5 to 1 in 2012. With increased enrollment, the dollars spent per pupil has decreased from $6,600 in 2010 to $5,803 in 2012.

In Rose County, the 2010 national census reported a median household income of $42,680, which is lower than the state average of $44,587 and the national average of $52,762.00. Over the past several years, the student enrollment with in the school district has increased with enrollment going from 9,850 students in 2010 to 9,970 students in

2012. Clear Heights Intermediate School has undergone a change in grade level configuration since 2010. In school years 2009-10 and 2010-11, the school was considered a middle school serving students in grades five and six. In 2011-12, the school changed to serve students in grades four and five. Currently, there are 944 students enrolled at Clear Heights Intermediate School with $5,894 in dollars spent per pupil.

Calm Brook has maintained an "Excellent" absolute rating on South Carolina Annual School Report Card Data for the past four years. The school has maintained an "Excellent" growth rating for the past three years. The school has a current enrollment of 600 students in kindergarten through fifth grades. There are 33 certified teachers on staff. The 90 fifth grade students are grouped into four classes--one single-sex male; one single-sex female; and two coeducational. The same two teachers have taught the single-sex classes since their inception five years ago. Calm Brook has 42.3% of its students on free and reduced lunch. Calm Brook is not designated a Title I school, and has an overall grade of **A** on the federal accountability waiver.

In 2012, 90.8% of the school's fifth graders were met or exemplary on the English/Language Arts portion of the PASS. In the same year, 92.1% of fifth graders were met or exemplary on the mathematics portion of the PASS. In grades 3-5, male students had a mean score of 676.2 on the English/Language Arts portion of the PASS compared to 680.9 for female students. Male students had a mean score of 677.3 compared to 673.3 for female students on the mathematics subject of PASS.

The single-sex program at Calm Brook Elementary school initially began at the start of the 2008-09 school year. The school houses grades K-5, but the single-sex

program is only an option for fifth grade students. The 43 students enrolled in the single-sex classes were selected based on predetermined criteria including teacher/principal recommendation and parent request.

Clear Heights Intermediate School is not considered a Title I school. The school has a current enrollment of 944 students in grades four and five. The enrollment in grade four is 354, and the enrollment in grade five is 590. Clear Heights has an overall grade of **A** on the federal accountability waiver.

Single-sex education was an option for students when Clear Heights Intermediate was home to students in grades five and six. Currently, the school has single-sex options in both grades four and five. Specifically in grade five, there are five single-sex female classes, five single-sex male classes, and fifteen coeducational classes.

In 2012, 81.3% of the school's fifth graders were met or exemplary on the English/Language Arts portion of the PASS. In the same year, 81.8% of fifth graders were met or exemplary on the mathematics portion of the PASS. In grades 4-5, male students had a mean score of 659.0 on the English/Language Arts portion of the PASS compared to 671.3 for female students. Male students had a mean score of 667.8 compared to 664.4 for female students on the mathematics subject of PASS.

Description of the Teachers and Classes

Ms. Wright teaches a class of 21 males. Ms. Wright has been teaching the single-sex class for six years and has been an educator for 12 years. She has taught at Calm Brook for all eight years of its existence and was previously at another elementary school in Southern School District.

Ms. Beaty teaches a class of 22 females. Ms. Beaty has been teaching the single-sex class for six years and has been an educator for 24 years. She has taught at Calm Brook for the past eight years and was previously at other elementary schools in South School District.

Ms. White and Ms. Hand each teach coeducational classes of fifth grade students at Calm Brook. Ms. White's class has 20 students. There are 11 males and nine females in Ms. White's class. There are nine males and 10 females in Ms. Hand's class. Ms. White has been teaching at Calm Brook for three years and has taught fifth grade for three years. Ms. Hand has been teaching at Calm Brook for eight years and has taught fifth grade for six years.

The classes studied at Clear Heights were randomly selected from 15 fifth grade classes at the school. Ms. Suber teaches a class of 22 males. Ms. Suber has been teaching single-sex classes for four years and has been an educator for six years total. She has taught in the same school district all six years.

Ms. Bryant teaches a class of 24 females. Ms. Bryant has been teaching the single-sex classes for three years and has been an educator for five years. She has been employed as an educator in the Rose School District for all five of her years in education.

Ms. Jackson and Ms. Williams each teach coeducational classes of fifth grade students at Clear Heights. Ms. Jackson's class has 23 students. Of those students, 13 are males and 10 are females. Ms. Jackson has taught fifth grade for eight years in Rose School District. Previously, she taught a single-sex males class for three years. Ms. Williams has a class of 23 students also. Of the 23 students, 14 are males and nine are

females. Ms. Williams has been an educator for seven years and has spent all seven in Rose School District. She has always taught coeducational classes.

Research Design and Methods

To address the questions raised in this study most effectively, case study data was used. Data collection occurred mainly through classroom observations, interviews, focus groups, survey and review of achievement data.

To address the first three questions regarding the implementation of gender-specific instructional practices in single-sex education, both qualitative and quantitative methods were used. The researcher observed the four fifth grade classes—the two coeducational and the two single-sex--at Calm Brook Elementary School and four classes at Clear Heights Intermediate School to look at methods of content delivery. At both schools, the researcher observed two randomly selected coeducational classes and two single-sex—one male and one female. Specifically, the researcher looked at if the content was delivered differently in the single-sex classes compared to the coeducational classes through the use of gender-specific strategies. In addition to the observations, a survey was administered to the male and female classes at each school to determine which gender-specific instructional strategies the students perceived as beneficial to their learning. Four male students and four female students at each school were chosen to participate in one-on-one interviews and focus groups to gather information on the students' perceptions of the single-sex experience and the instructional strategies they found as beneficial to their learning. The final research question on student achievement was address quantitatively.

To address the first three questions of the study, classroom observation, survey, interviews, and focus groups were used. In looking at the first two research questions, the researcher observed a single-sex male class, a single-sex female class, and two coeducational classes at each school over an eight-week period in the fall semester of the 2013-14 school year. Specifically, the researcher looked for differences in instructional delivery between the single-sex classes and the coeducational classes. The researcher looked for gender-specific instructional strategies in single-sex education as espoused by Mulholland et al., 2004; Parsons, 2004; Sax, 2006; Gurian et al., 2009; and Chadwell, 2010. The researcher also looked for any gender-specific strategies that were used in the coeducational classes, or if instruction was delivered in a more verbal and sedentary manner (King et al., 2010) in the coeducational classes. The students in the single-sex classes also participated in a survey to determine their perceptions of the single-sex experience and to determine if there were specific gender-friendly strategies they perceived as beneficial to their learning.

To further address the third research question, four males and four females from the single-sex classes at each school were selected to participate in in-depth interviews that resulted in the phenomenological case study. These students also participated in focus groups to broaden the researcher's understanding of the single-sex classroom experience. Through case study the researcher could understand which instructional strategies the students perceived to be the most beneficial to their learning and achievement. The general perceptions the students have of learning were analyzed through descriptive statistics while qualitative methods were used to gather a deeper

understanding of how the instructional strategies used in the single-sex classroom can influence the perceptions the students have of learning.

In looking at the fourth research question on student achievement, each school's MAP data were reviewed. The researcher looked at the percentage of students meeting one year's growth target on MAP in the single-sex and coeducational classes. The data was compared to determine if there was evidence that students in single-sex classes achieved at higher levels than students in coeducational classes.

Case Study Sampling Frame

The researcher's decision to focus on fifth grade single-sex classes was intentional. South Carolina's single-sex programs are present in 36 elementary schools, and 26 of those schools focus the single-sex program on fifth grade students. Erik Erikson notes fifth grade is positioned between two significant psychosocial stages: *Industry vs. Inferiority* and *Identity vs. Role Confusion* (Harder, 2009). While in *Industry vs. Inferiority* students have to learn how to cope with the academic and social constructs employed by schools. Successful students develop a sense of industry while those who are not successful begin to feel inferior. Students at this age typically are more inclined to take on new skill sets.

When students progress to the next stage of *Identity vs. Role Confusion*, they begin to identify themselves as either successful academically or not. If the students did not experience success at the previous stage, they will become inclined to identify themselves as reluctant students. Socially, if male students begin to view academic

success as a female endeavor, the males could begin to shift away from trying to excel in the classroom.

Four male students and four female students from both single-sex schools were selected to participate and parental consent was acquired (see Appendix A). Qualitative research strives to explain through the views of the participants. Criterion sampling was used to gather student participants representing a variety of academic and social characteristics. One strong reader, two average readers, and one struggling reader from both the male and female classes were selected for the case study. Ability levels were determined primarily by the students' MAP scores, classroom grades, and teacher recommendation.

Case Study Data Gathering Methods

Through multiple qualitative methods, case study participants were encouraged to share their perceptions of learning while in the single-sex classrooms. Interviews and discussions were conducted throughout the data collection period. Based on the work of Bogdan and Biklen (1992, p. 34), phenomenology seeks to "understand how and what meaning they (males and females) construct around events (learning) in their daily lives." This particular design method allowed for an understanding of how socially constructed interactions can influence a child's perceptions as well as their achievement (Merriam, 2002).

Participants were encouraged to share their perceptions of instruction in the single-sex classrooms as compared to instruction in the coeducational classrooms. Interviews and discussions were held during the month of September 2013 when students

could reflect upon previous instruction in the coeducational and in the current single-sex classroom.

Over the course of an eight week period during the fall semester of the 2013-14 school year, data were gathered through interviews and focus groups. Each of the eight participants was interviewed once and participated in one focus group. To be mindful of any ethical considerations, all interviews and focus groups remained confidential. Each interview lasted approximately 30 minutes and each focus group lasted approximately 45 minutes.

Case Study Data Analysis Methods

As interviews and focus groups were conducted and transcribed, interviews were read and coded as a way to identify commonalities and emerging themes. A list of categories and themes was developed after reading the interviews. The data were organized by similar topic, assigned a code, and grouped according to the research questions of the study and the questions from the researcher-developed survey and interview questions. Miles and Huberman (1994) define the process of coding as developing labels for units of meaning to the descriptive or inferential data gathered during research. Tesch (1990) advises that during coding, the researcher has to seek the meaning in a piece of information. For example, if a respondent responds to the question, "Is flexible seating allowed in the classroom?" The researcher could code this information as "environment" because the student recognizes opportunities for flexible seating are allowed in the classroom.

After the initial coding of the data, a copy of the coded data was made for reference. As codes were assigned to the data, chunks of coded data were grouped together. Chunks of coded data were placed in labeled folders as recommended by Miles and Huberman (1994). After separating the chunks of data, the next work involved finding connections between the coded chunks of data. The process will allow the researcher to analyze the commonalities and emerging themes. All transcripts were then reviewed one final time. To validate research discoveries, the data was compared to current literature.

To attend to the second question on instructional delivery, the third question regarding student perception of the single-sex experience, and the fourth question regarding student achievement, quantitative methods were also used. The researcher's survey (see Appendices B and C) attempted to address the perceived benefit from gender-specific strategies in the single-sex classroom. The survey data provided a broad perspective in a relatively short time frame. Historical data from the reading and math administration of the Measures of Academic Progress (MAP) was reviewed, comparing the class average of students meeting one year's growth target from the single-sex and coeducational classes of each school. The data was reviewed to determine if there are significant differences in the achievement of males and females in the single-sex and coeducational classes.

Reporting the Data

From the classroom observation data, the interview and focus group data, the survey data, and the achievement data, the researcher synthesized the data and confirmed the findings. Through peer review, colleagues thoroughly critiqued the study's

procedures and findings in order to note any discrepancies that undermine the credibility of the work.

The researcher used data triangulation from the results of the observations, interviews and focus groups, survey data, and achievement data. Cohen and Marion (2000, p. 254) define triangulation as an "attempt to map out, or explain more fully, the richness and complexity of human behavior by studying it from more than one standpoint." Though triangulation, the researcher attempted to provide a balanced snapshot of the pros and cons of single-sex education in an elementary setting.

Limitations

With all research, there are limitations and restrictions to the work. The restrictions may be found in location or time, the personal biases of the researchers, or in narrowing the focus of the research. Consequently, the results found in situation may be different compared to another study in a different school, district, or state.

The location is limited to two elementary schools in South Carolina with single-sex education in the fifth grade during school year 2013-2014. The demographic make-up of the schools and districts involved may differ and similar results may not exist in other states with single-sex education programs.

Differing demographics may also result in differences in program results. Calm Brook Elementary School and Clear Heights Intermediate School both offer single-sex and coeducational classes in fifth grade. However, where Calm Brook is an elementary school with students in grades kindergarten through five, Clear Heights serves students only in grades four and five. Calm Brook is also a school with roughly 600 students, and Clear Heights is larger with 944 students. Differing demographics may also result in

different opportunities for professional development as well as parental awareness and involvement in the program.

Another possible restraint to this is time. The time frame is limited to eight weeks. A longer time frame for the study may impact the results.

Trustworthiness

As the researcher, subjective biases are the result of life experiences and the influences of people. Personal experience of single-sex education can strengthen the participant/observer rapport. This relationship can foster an increased understanding of the phenomenon being researched. While the stories may not be the same, similarities may be shared as a result of the elementary school experiences. Bracketing subjectivities is needed to collect accurate data.

So the participants' views can be heard, the researcher must be aware of subjectivities and share the participants' views and not her own. Intentional conversations with peers and colleagues helped the researcher monitor and recognize personal subjectivities.

To ensure trustworthiness of and validity of the data, several procedural strategies were employed. In order to maintain a close monitoring of personal thoughts and biases, the researcher keep a journal. Through constant journaling, subjectivities were kept from skewing the results. The researcher worked to build rapport and trust with the participants which helped to create sincere and authentic responses during the interviews. A peer reviewer was a fellow colleague in the graduate program. The reviewer was responsible for reading each interview transcription and the survey results to make sure

what was said was accurately communicated (Lincoln and Guba, 1985). Data were shared with study participants as a means of peer review to authenticate the results of the study.

Personal Subjectivities

As a female, the researcher has been confident student and has not struggled academically. However, being a parent of two children—one male and one female, and as a former elementary school principal, the researcher may have some biases that could pose possible limitations. As an educator, the researcher's competitive nature drives attempts to foster academic success for all. Attending elementary school over 30 years ago, the researcher didn't experience teachers' differentiating instruction based on the brain-based differences between males and females. Teachers are not fully aware of the brain-based differences between males and females and strategies to accommodate these differences. The researcher desires to be able to equip teachers with the professional development to address learning differences between males and females and help narrow the achievement gap.

As a parent of two children, the personal perception of their classroom success differs. One child is bright and articulate and is able to quickly grasp the classroom content as it is delivered without modifications. However, the male child, while just as bright as his sister needs brain-based strategies for male students in order to experience classroom success. For selfish reasons, the researcher wants all teachers to be aware of the strategies so male children do not begin to underachieve.

Summary

In Chapter 3, the research methodology was explored and defined. Along with the research methodology, limitations and the researcher's personal subjectivities were

reviewed. Procedures for maintaining the trustworthiness of data were outlined. In Chapter 4, the results of the research will be described.

Chapter 4

Results

Introduction to the Results

The first three of four questions raised seek to provide an understanding of the strategies in place to address the gender-specific needs of males and females and possible evidence that teachers adjust the instructional delivery based on whether or not they teacher single-sex or coeducational classes. The questions are: Is there evidence that teachers adjust the instructional delivery based on whether they are teaching single-sex classes or coeducational classes?; What gender-specific instructional strategies are being implemented in elementary schools with fifth grade single-sex classes?; and What gender-specific instructional strategies do fifth grade students in single-sex classes perceive as beneficial to their learning? To address these questions, qualitative and quantitative methods were used. Through classroom observations, the researcher looked for the presence of gender-specific strategies in the instructional delivery in the single-sex classes and if the content was delivered differently in the coeducational classes as compared to the single-sex classes. Through surveys (Appendices B and C) students were asked to consider a variety of questions. The survey questions sought to address whether gender-specific strategies were used in the classroom and which strategies were most beneficial to their learning. The data gathered from the survey provide a broad perspective on the issue in a relatively short period of time. Tables will be included to provide a comprehensive understanding of the students' various responses.

In looking at the implementation of gender-specific strategies, four classes at Calm Brook and four classes at Clear Heights were observed. Each of the four classes was observed three times during the course of the study. Each observation lasted between 30 and 40 minutes. Observations were conducted in the content areas of English language arts, mathematics, science, and social studies. Specifically, the researcher looked at the instructional strategies used to deliver the academic content. The strategies are grouped into the following areas: gender-inclusive, sensory, physical environment, content delivery adjustments, and extracurricular.

The survey was administered to male and female students at both Calm Brook Elementary School and Clear Heights Intermediate School. There were 44 female and 38 male students who completed the survey. The data from the survey helped to determine the students' perceptions of the use of gender specific strategies and which ones the students considered most beneficial to their particular styles of learning.

All of the students from Calm Brook are participating in a single-gender classroom for the first time in their elementary school careers. Consequently, any perceptions the students have about single-gender classes or their benefit on student learning will not be based on previous experience, but could be based on external influences. At Clear Heights, all of the males and females surveyed are participating in single-sex classes for the second year. Any perceptions they have may be influenced by prior experience in the single-sex environment.

After the surveys were administered, the results were tabulated and analyzed. Some questions required students to select from a limited number of choices. For example, one question asked students to rate themselves as a mathematician by selecting

below average, average, or above average. Other limited response questions based on the gender-specific instructional strategies asked students to select either *not helpful to my learning, somewhat helpful to my learning, or very helpful to my learning.* Through descriptive statistical methods, the responses were tallied and analyzed. The survey contained several free-response questions. To provide an analysis of these questions, qualitative responses will be coded and then organized by emerging themes.

Classroom Observation Data

To address the first two questions: 1)Is there evidence that teachers adjust the instructional delivery based on whether they are teaching single-sex classes or coeducational classes and 2)What gender-specific instructional strategies are being implemented in elementary schools with fifth grade single-sex classes both qualitative and quantitative measures were used. The researcher observed the single-sex males class, single-sex females class, and two coeducational classes at each school for a total of 24 observations.

The researcher designed student survey was used as the basis for looking for gender-inclusive and gender-specific strategies. The researcher looked at both the number of times the particular strategies were present over the course of the observations and the content areas in which the strategies were used. All observations were in the content areas of mathematics, language arts, science, and social studies.

Male Classroom Observations

In the observations of the single-sex males' classrooms, gender-inclusive strategies were present. In the six observations, technology use was present in five. Uses of technology included projecting videos on the promethean and SMART boards, using

the internet for research, and using the computer and iPads for interactive games. The use of technology was seen in observations of English language arts, math, science, and social studies. Working with a group or a partner was observed in three of six observations. The partner work was observed primarily in mathematics instruction. Problem solving across content areas was seen in two of the six observations. The problem solving activities were integrated into science content.

Attention to males' sensory needs was observed. In two of six observations, the teacher permitted the noise level to escalate during instruction, and the male students continued in meaningful work. In all observations, there was evidence that the teacher changed her voice or used her voice to create sound effects such as saying "boom" or imitating the voice of an animated character. Chadwell (2010) and Gurian et al., (2009) report vision is the best sensory mode for males. The two single-sex males' classrooms observed were well lit spaces with natural light along with overhead fluorescent lighting as well as lamps in various spaces. In all six of the observations, directions for completion of the lesson were written on the whiteboard or projected via the classroom projection system.

The teachers included flexible seating options such as allowing male students to sit, stand, or lay on the floor to complete independent and group tasks in each of the six observations. The teachers also used random means such as a card system to create daily flexibility in where the males sat in the classrooms. In each classroom the males could move about easily. Both classrooms were of standard size according to their school floor plans and all observed lessons took place within the classroom.

The researcher looked at nine possible content delivery strategies in the male classroom. These included books on topics of interest to males; games; using skits/role play; maintaining a quick pace; chunking subject content; using manipulatives in math; using hands-on materials in science, social studies and language arts; discussing brain characteristics before a lesson starts; using timers for completing work; and previewing what will be learned before the lesson starts. The strategy of using a timer to complete independent work was seen in all six observations. In four of the observations, the time was projected via the classroom projection system which also was a visual strategy.

Chadwell (2010) and Gurian et al., (2009) advocate the use of active learning strategies for male students. In three of the six observations, the lessons were taught in a quick pace through the use of rapid fire questions. Games and the use of small chunks of information were seen in two of the six observations. In one math observation, manipulatives were used and hands-on materials were used in a science lesson. A role play activity was observed in an English language arts lesson. Sax (2006) advocates teaching males how to target their brain strengths. Discussing males' brain characteristics was not observed in any of the six lessons. In all six lessons, the teacher was observed giving the males a preview of what learning would take place during the lesson.

In addition to content delivery strategies, King et al. (2010) cite the importance of the design of extracurricular activities. The researcher focused on two particular strategies: having role models to serve as speakers on school and social topics and having adult males serve as guests for read-ins and other school activities. The researcher did not observe the strategies, but in discussions with Ms. Wright and Ms. Suber, there were opportunities for adult males to interact with the students on opportunities such as career

day and school assemblies. In both classrooms, the teachers set up opportunities for male students to assume leadership roles. In Ms. Suber's classroom, there were designated homework checkers for each subject. In both classrooms, male students led by explaining content and by demonstrating how to solve math problems.

Female Classroom Observations

One female class Calm Brook and one at Clear Heights were observed three times. During the observations, the researcher looked for the presence of gender-inclusive strategies and gender-specific strategies regarding sensory experiences, the physical environment, content delivery, and extracurricular programming. The classes were observed in the content areas of mathematics, English language arts, science, and social studies.

Gender-inclusive strategies were observed over the course of the six observations. In all six observations the teachers integrated technology into the lessons via the promethean/smart boards or via computer/iPads. In four of the six observations, females were involved in partner or small group work primarily in math. Chadwell (2010) and Gurian et al., (2009) advocate group work for girls, but also caution that teachers closely monitor group dynamics. Where group work was observed, the teacher was responsible for assigning partners based on student academic level or teacher choice. Both Ms. Beaty at Calm Brook and Ms. Bryant at Clear Heights used proximity to monitor group work and intervened in instances were one female tried to dominate the discussion. Problem solving was integrated into two lessons, once in science and once in social studies.

Sax (2006) speaks to the need for teachers of females to adjust the volume of their voices to avoid conveying anger and for teachers to design classrooms allowing for quiet

work spaces for females. In six observations, the researcher observed two instances of the teacher changing her tone of voice to a whisper when correction was needed during small group work sessions. Both single-gender female classes were designed with tables in the rear of the classroom. In three observations, female students moved to these tables to get away from the activity around them. These extra tables also doubled as spaces where a teacher could send a small group to work without distracting the entire class.

During the observations, the researcher focused on eight female friendly gender-specific strategies. The specific strategies were: teachers answering a question with a question; incorporating movement into math lessons, using journals in math, science, and social studies; writing daily; allowing few questions before the start of work; teacher asking clarifying questions to check student learning; discussions in pairs and small groups; and role play in science and social studies.

Several strategies were not observed. These were incorporating movement in math, limiting questions before the start of work, and incorporating role play in science and social studies. Female students tend to have stronger verbal skills than do their male counterparts (Gurian et al., 2009; Chadwell 2010). Providing opportunities for students to write daily and have class discussions in pairs were observed in all six observations. In both classes, there was evidence of student writing across the four content areas of math, science, English language arts, and social studies. In four of the six observations, girls were observed using journals and word games in math, science, or social studies. Ms. Bryant utilized math journals for students to solve problems. Ms. Beaty used a social studies journal for students to write to family and friends about the social studies content learned.

In two observations, one in math in Ms. Bryant's classroom and one in social studies in Ms. Beaty's classroom, the teacher answered student questions with a question. In both instances, the female had to pause and think before responding. In two additional observations, the teacher asked clarifying questions to check student understanding. Both strategies required the females to answer in phrases or complete sentences rather than in one-word responses.

Regarding extracurricular strategies, the researcher sought to observe instances where female role models in fields of work not typical for females incorporated in the work; fields trips to connect learning to the real world; and leadership opportunities to connect with female role models. At Calm Brook during career day, the females had an opportunity to connect with two female engineers who were the only females at their particular company of fifty employees. While the researcher did not observe any field trips, the females mentioned field trips they had taken in connection with their classroom discussions. In one observation at Calm Brook, the females mentioned information learned at a historic site and its' relationship to their social studies content. The researcher did not observe any leadership opportunities to connect with female role models. Gurian et al., (2009) speak to the need of promoting social responsibility so females become comfortable taking on leadership roles. At Clear Heights, the school uses Stephen Covey's *Leader in Me* principles in developing student leadership. In three observations at Clear Heights, the female students volunteered for leadership roles including leading a small group in a math lesson and being the reporter for a small group's findings.

Coeducational Classroom Observations

Two coeducational classrooms at each school were observed. Ms. Hand and Ms. White are the two coeducational classroom teachers at Calm Brook. Both have only taught coeducational classes. Ms. Jackson and Ms. Williams are the two coeducational classroom teachers at Clear Heights. Ms. Williams has only taught coeducational classes. Ms. Jackson has participated in professional development for teaching single-sex classes and has previously taught a single-sex males class in fifth grade. Each classroom was observed three times. In observing the coeducational classes, the researcher looked for the presence of the gender-inclusive strategies as well as the presence of boy-friendly and girl-friendly strategies.

The gender-inclusive strategies of working with a partner, completing problem-solving activities in subjects such as science, social studies, and language arts, and technology use were present across the twelve observations. All observations integrated some use of technology whether via the promethean/smart board or via the computer or iPad. Technology activities included viewing videos on science and social studies content, researching topics in science and social studies, and working on math and reading concepts. Instructional videos in math were viewed from the internet. Working with a partner or small group was observed in four observations in math and reading. Problem solving across the content was observed in three lessons.

Boy-friendly strategies were used in the classroom. In the observations at Clear Heights, Ms. Jackson and Ms. Williams both used flexible seating arrangements and placed students so they were side by side. There was no evidence in any of the observations where students were allowed to sit, stand, or lay on the floor to complete

work. In each of the observations of the coeducational classes, instructions for completing work were noted visually either on the whiteboard or on the promethean board. At Clear Heights, both coeducational teachers incorporated charts and graphs about student progress which was another way of providing visual content to students.

Timers for completing work were seen in all observations with Ms. Jackson and Ms. Williams at Clear Heights. In one observation of Ms. Hand's class at Calm Brook, a timer was used for completion of math work. In looking at other male friendly content delivery strategies, books and artifacts of interest to males were present in all of the coeducational classes. In one lesson in Ms. White's class at Calm Brook, the students read a story with a male protagonist, The Wednesday Wars by Gary Schmidt. In Ms. Jackson's class at Clear Heights, the children read the book Dandelions by Eve Bunting and Greg Shed, which has a female protagonist.

Competition was embedded into the work in Ms. Jackson's class. Instances included Ms. Jackson saying, "I will give three points to the team who correctly completes the board assignment first," or "I will give a point to the team who cleans their area first."

In looking at girl-friendly strategies, flexible seating was also observed in the coeducational classes at Clear Heights. In Ms. Jackson's class content delivery strategies appropriate for girls were present. Ms. Jackson answered girls' questions with a question which led to the female students having to pause, think, and respond in phrases or sentences. Class discussions in pairs were observed in all of the coeducational classes. Ms. Hand and Ms. White used strategies such as "turn and talk" to share science and social studies content. Ms. Jackson and Ms. Williams at Clear Heights also provided

opportunities for students to talk in the language arts and science content. In Ms. Jackson's class, there was evidence of students writing daily in math and science content. Ms. Jackson also used raps, rhymes, and music to deliver math content and to end the class community building session.

The researcher did not find boy-friendly or girl-friendly strategies embedded in extracurricular activities. At Clear Heights, the school focuses on Stephen Covey's *Leader in Me* principles. The males and females in the coeducational classes there had roles where they demonstrated leadership such as being the homework checker or demonstrating problem solving for the classes.

Survey Data

To answer the third research question: 3)What gender-specific instructional strategies do fifth grade students in single-sex classes perceive as beneficial to their learning surveys (Appendices B and C), interviews(Appendix D), and focus groups (Appendix E) were used. The tables reflect the combined student responses from both schools.

The first question on the survey, as reflected in Table 4.1, was an open-ended question asking students to indicate aspects of single-sex education they considered important. Of the females surveyed, 47.7% of the females reported they worked well in the all-female learning environment, and 36.8% of the males liked the social aspects and relationships with peers.

Table 4.1

Student Perceptions of the Single-Gender Classroom Experience

Perception	*Percentage*	*n*
Female Perceptions		
All-Female Learning Environment	47.7	21
Social Aspects/Relations with Peers	13.7	6
Better Ability to Focus	9.1	4
Increased Confidence	9.1	4
Teacher	6.8	3
Learning	6.8	3
Decreased Drama	6.8	3
Male Perceptions		
Social Aspects/Relations to Peers	36.8	14
All-Male Learning Environment	29.0	11
Better Ability to Focus	18.4	7
Teacher Understands Male Learning Styles	10.5	4
Freedoms in Classroom	5.3	2

Table 4.2 presents the survey results of students' favorite classes. Of the females surveyed, 56.9% chose math. Of the male respondents, 34.2% chose science as their favorite subject.

Table 4.2

Favorite Class in School

Class	*Percentage*	*n*
	Females	
Math	56.9	25
Social Studies	13.6	6
Science	11.4	5
Art	6.8	3
Language Arts	6.8	3
Music	4.5	2
	Males	
Science	34.2	13
Math	26.4	10
Social Studies	13.2	5
Computer Lab	10.5	4
Physical Education	10.5	4
Art	2.6	1
Language Arts	2.6	1

When asked to name their least favorite class in school, as noted in Table 4.3, 41.0% of females chose social students. Of the male respondents, 36.9% chose math.

Table 4.3

Least Favorite Class in School

Class	*Percentage*	*n*
	Females	
Social Studies	41.0	18
Math	27.3	12
Science	13.6	6
Language Arts	13.6	6
Physical Education	4.5	2
	Males	
Math	36.9	14
Language Arts	28.9	11
Science	21.0	8
Computer Lab	5.3	2
Social Studies	5.3	2
Art	2.6	1

Students in the single-sex classes were also asked to reflect on their experiences in the coeducational classroom and think about those aspects of coeducational classes that had been positive in Table 4.4. Of the females 40.9% reflected positively on friendships, and 39.5% of the males reflected positively on classwork assigned.

Table 4.4

Positive Aspects of Coeducational Classes

Aspect	*Percentage*	*n*
	Females	
Friendships	40.9	18
Teacher	31.8	14
Classwork	27.3	12
	Males	
Classwork	39.5	15
Friendships	31.6	12
Teacher	21.1	8
Teamwork/Synergy	7.8	3

Conversely, as noted in Table 4.5, students in the single-sex classes were surveyed about perceptions of coeducational classes that had a negative impact on their school experience. Of the females, 52.3% reflected negatively on having males in class, and 36.8% of the males reflected negatively on having females in class.

Table 4.5

Negative Aspects of Coeducational Classes

Aspect	*Percentage*	*n*
	Females	
Males in Class	52.3	23
Strict Teacher	22.7	10
Classroom Distractions	15.9	7
Bullying	9.1	4
	Males	
Females in Class	36.8	14
Social Aspects	26.3	10
Classwork Assigned	15.8	6
Nothing	7.9	3
Strict Teacher	7.9	3
Classroom Distractions	5.3	2

In Table 4.6, students were asked about their perceived reading ability. Of the female respondents, 56.8% considered themselves average readers, and 44.7% of the boys considered themselves above average readers.

Table 4.6

Reading Ability

Rating	*Percentage*	*n*
	Females	
Below Average	6.8	3
Average	56.8	25
Above Average	36.4	16
	Males	
Below Average	15.8	6
Average	39.5	15
Above Average	44.7	17

Strategies to improve reading are revealed in Table 4.7. Of the female respondents 68.3% thought that practicing reading more often would help them improve as did 65.8% of the males.

Table 4.7

Improving Reading Ability

Strategy	*Percentage*	*n*
	Females	
Practice/Read more often	68.3	30
Read more challenging books	9.1	4
Implement comprehension checks	6.8	3
Work on fluency	4.5	2
Remove competition	4.5	2
	Males	
Practice reading	65.8	25
Work on vocabulary	10.6	4
Read more challenging books	7.9	3
Work on concentration	7.9	3
Implement comprehension checks	5.2	2
Slow down when reading	2.6	1

Survey results regarding students' writing ability are presented in Table 4.8. Writing ability is related to creativity and not penmanship. From these results, 70.5% of females considered themselves average writers, as did 55.3% of males.

Table 4.8

Writing Ability

Rating	*Percentage*	*n*
	Females	
Below Average	6.8	3
Average	70.5	31
Above Average	22.7	10
	Males	
Below Average	13.2	5
Average	55.3	21
Above Average	31.5	12

Student rated strategies to improve writing are presented in Table 4.9. Revision and editing was rated as important by 34.1% of females, and working on word choice was rated important by 28.9% of males.

Table 4.9

Improving Writing Ability

Strategy	*Percentage*	*n*
	Females	
Work on revision/editing	34.1	15
Write more often	22.7	10
Better creativity/imagination	15.9	7
Work on word choice	11.4	5
Read work by authors	9.1	4
Work on sentence structure	6.8	3
	Males	
Work on word choice	28.9	11
Work on sentence structure	23.7	9
Work on revision/editing	21.1	8
Write more often	18.4	7
Read work by authors	7.9	3

Ratings for mathematics ability are in in Table 4.10. Average or above average ratings were each chosen by 43.2% of females, and 57.9% of males considered themselves average.

Table 4.10

Mathematics Ability

Rating	*Percentage*	*n*
	Females	
Below Average	13.6	6
Average	43.2	19
Above Average	43.2	19
	Males	
Below Average	13.2	5
Average	57.9	22
Above Average	28.9	11

Related to students' mathematical ability is their perception regarding strategies for improving found in Table 4.11. Of the female respondents, 63.7% thought additional practice would help, as did 76.3% of males.

Table 4.11

Improving Mathematics Ability

Strategy	*Percentage*	*n*
Females		
Practice/study	63.7	28
Focus in class during math instruction	15.9	7
Check work	6.8	3
Learn different strategies	6.8	3
Use manipulatives/modeling	4.5	2
Ask teacher for help	2.3	1
Males		
Practice	76.3	29
Nothing	7.9	3
Ask teacher for help	7.9	3
Watch math videos	5.2	2
Learn different strategies	2.6	1

The female students were asked to rate the benefit of gender-specific instructional strategies on their learning as reflected in Table 4.12. In looking at the strategies, females were asked to rate each strategy as not helpful, somewhat helpful, or very helpful to their learning.

Table 4.12

Helpfulness of Gender-Specific Strategies-Females

Strategy	Not Helpful		Somewhat Helpful		Very Helpful	
	n	*Percentage*	*n*	*Percentage*	*n*	*Percentage*
Working with a partner or group	0	0.0	17	38.6	27	61.4
Problem solving	23	52.3	21	27.7	0	0.0
Technology	2	4.5	12	27.3	0	0.0
The teacher changes tone of voice not to sound angry	29	65.9	15	34.1	0	0.0
Quiet work area	0	0.0	10	22.7	34	77.3
Cozy reading area	33	75.0	11	25.0	0	0.0
Rotating seating	1	2.2	10	22.7	33	75.1
Teachers answer a question with a question	0	0.0	14	31.8	30	68.2
Math involving movement	33	75.0	11	25.0	0	0.0
Journals and word games	0	0.0	24	54.5	20	45.5
Opportunities to write daily	0	0.0	18	40.9	26	59.1
Few procedural questions allowed	33	75.0	11	25.0	0	0.0
Questions to clarify	2	4.5	10	22.7	32	72.8
Discussions in pairs or groups	0	0.0	16	36.4	28	63.6
Role play activities	0	0.0	17	38.6	27	61.4
Women as career role models	21	47.7	18	40.9	5	11.4
Extracurricular connections	0	0.0	8	18.2	36	81.1
Leadership opportunities to connect	0	0.0	14	31.8	30	68.2

Male students rated the benefit of gender-specific strategies on their learning in Table 4.13. The categories are the same for the females. However, within the categories, the strategies differ.

Table 4.13

Helpfulness of Gender-Specific Strategies-Males

Strategy	Not Helpful		Somewhat Helpful		Very Helpful	
	n	*Percentage*	*n*	*Percentage*	*n*	*Percentage*
Working with a partner or group	25	65.8	13	34.2	0	0.0
Problem solving	2	5.3	16	42.1	20	52.6
Technology	1	2.5	9	23.7	28	78.7
High level of noise	19	50.0	19	50.0	0	0.0
Flexible seating	6	15.8	8	21.1	24	65.1
Clutter free classroom	19	50.0	19	50.0	0	0.0
Increased space	3	7.9	14	36.8	21	55.3
Books on male topics	3	7.9	14	36.8	21	55.3
Skits/role play	5	13.2	33	86.8	0	0.0
Games in lessons	0	0.0	10	26.3	28	73.7
Quick pace in lessons	0	0.0	20	52.6	18	47.4
Chunking subjects	26	68.4	12	31.5	0	0.0
Manipulatives in math	15	39.5	23	60.5	0	0.0
Hands-on materials in subjects	0	0.0	11	28.9	27	71.1
Brain characteristics discussed	23	60.5	15	39.5	0	0.0
Timers used	0	0.0	8	21.1	30	78.9
Preview to lessons	0	0.0	22	57.9	16	42.1
Male role models	0	0.0	29	76.5	9	23.7
Male guests for activities	0	0.0	23	60.5	15	39.5

Interview Data

Interview data were also used to answer research question three: 3)What gender-specific instructional strategies do fifth grade students in single-sex classes perceive as beneficial to their learning? Data were gathered through interview questions (see Appendix D). Each of the eight female and eight male participants was interviewed one time. Each participant was given a pseudonym in order to protect his or her identify as well as to encourage authentic and sincere responses. Due to the young age of the students, the interviews were held to 30 minutes and the focus group session did not exceed 45 minutes.

The interviews were conducted, transcribed, read and coded to identify common themes. The interview data were organized by similar themes and grouped based on the relevance to the research questions of the study. Connections between the data were sought and an analysis of common themes was revealed.

Calm Brook Females

Wendy

Wendy is a ten-year-old Caucasian female enrolled in the single-sex class at Calm Brook Elementary School. She lives with her sister age 12, brother age 17, mother, and father. Outside of school Wendy enjoys art, playing volleyball, and playing the piano. She has attended Calm Brook since kindergarten.

Wendy considers herself a good reader because she reads books that are sometimes confusing to others. She also believes she reads longer and more complicated books than others in her class. Regarding writing, Wendy doesn't think she is a good writer because she has a hard time "coming up with topics and things interesting to others." Wendy thinks she is a good math student because she understands math and makes good grades.

Wendy enjoys the small group work Ms. Beaty assigns in math and reading. Wendy's favorite subject is reading, and her least favorite subject is math. Wendy also likes the use of technology in the single-sex classes. She said, "I like it when Ms. Beaty posts questions in Edmodo and we can respond to her."

Wendy likes being in the single-gender class because she feels comfortable being with all girls and that she can be herself in this setting. She found it difficult to speak out in class in the coeducational setting. There isn't anything Wendy dislikes about single-

gender class. However, Wendy stated she doesn't think that would enroll in single-sex classes if offered in middle school.

Cindy

Cindy is an eleven-year-old Caucasian female. She lives with her mother, father, and sister age 16. Cindy likes playing with her friends. She also takes piano lessons and participates in Girls on the Run.

Cindy thinks she is an average reader because she is not behind in reading, but she stated "I am not in the top group." Cindy thinks she is a good math student because if she ever doesn't understand something, she can practice and get better at the concept. She also feels she is a good writer because she doesn't struggle with different genres of writing or with developing topics when writing.

Cindy stated science is her favorite subject, but writing is her least favorite subject although she does not struggle in writing. In math class Cindy likes when the teacher uses the students to role play solving a problem. She said, "Sometimes when the teacher does the work on the board without manipulatives, it goes by too quickly, and I just don't understand." She stated she likes technology, but when the students have to share technology, it is difficult.

In thinking about the single-sex class, Cindy feels comfortable in this setting. She feels most girls have similar learning styles and benefit by being grouped together.

Beth

Beth is an eleven-year-old Caucasian female. Prior to the current school year, Beth attended school in Florida. Beth lives with her mother, father, and brother age 13.

The current year is her first time in a single-sex class. Beth likes to go bowling and to read when she is not in school. Beth also participates in kick boxing classes.

Beth thinks she is an above average reader because she reads every day at home and on weekends. In math, Beth thinks she is an average student. She stated, "I do get some things, but I'm not that smart at math." Beth thinks she is an average writer as well. Beth said, "I am good at poems, but not always at other types of writing."

Beth's favorite subject is social studies because she likes learning about the history of people and seeing how people lived long ago. Her least favorite subject is science because it is confusing to try and remember the information. She stated, "Using fraction pieces and other manipulatives is really helpful in learning math." In reading and social studies, Beth likes being able to read and work in small groups with others to learn. She also mentioned technology was helpful to her learning.

Beth likes the single-sex class because she is around other girls her same age who like the same things she does. However Beth stated, "I don't like it when girls in class are not nice to me because I am short." If single-sex classes were offered in middle school, Beth thinks she would enroll.

Mary

Mary is an eleven year old Caucasian female who lives with her mother and her mother's boyfriend. She also lives with her baby sister age 10 months and nine-year-old brother. Mary enjoys playing with friends, running, dancing, and playing soccer. Mary began school at Calm Brook in second grade. Prior to that, Mary lived in Virginia and New York.

Mary thinks she is a good reader because she is able to use the strategies her teacher teaches. She does not think she is a good writer because she has a difficult time thinking of topics to write about that would be interesting to others. Mary thinks she is a "kind of" good math student. She stated she has difficulty with division.

In the single-sex classroom, Mary stated reading is her favorite subject and social studies is her least favorite subject. She stated that in math and reading working in small groups helps her learn. Mary also thinks using technology such as EdCanvas is helpful to learning all subjects.

Mary likes being in the single-sex class because the teacher helps the students sort out issues and get past the drama. She feels being in the single-sex class helps her concentrate better. If single-gender classes were offered in middle school, Mary thinks she would enroll.

Clear Heights Females

Erica

Erica is a ten-year-old African American female enrolled in the single-sex class at Clear Heights Intermediate School. She lives with her mother and her aunt. Outside of school, Erica enjoys competitive dance and softball. Erica was in the single-sex class as a fourth grader.

Erica thinks she is an average reader. She says she doesn't really enjoy reading and has to read over and over to grasp the meaning of a story, but she thinks she is a good writer because she knows good words to use and how to add details to her writing. She enjoys writing daily in her diary. Erica thinks she is an excellent math student and she is in the advanced math club. Erica said, "I think math is easiest to learn. I am good with numbers."

Erica said that science and social studies are her least favorite subjects. Math is Erica's favorite subject. Ms. Bryant has the students do partner work often, and Erica thinks it is helpful to her to be able to discuss subjects with others and talk about what they are learning. She also noted using technology such as the iPad is a good thing.

Erica enjoys being in the single-gender class because she likes being able to learn with other girls who have interests like she does. She also thinks if available in middle school, she would enroll in single-sex classes.

Brandy

Brandy is a ten-year-old Caucasian female enrolled in the single-gender class at Clear Heights. Brandy lives with her mother, father, brother age five and sister age 12. Brandy enjoys soccer and competitive swimming. She was in the fourth grade single-sex girls' class at Clear Heights, and has attended school in the same district since kindergarten.

Brandy feels she is a good reader. She said she reads well, but "stumbles if I am going too fast." Brandy thinks she is a good writer although it is not an activity she would pick if given a choice. Brandy said, "I'm ok at math. "Every year math gets harder for me, but in single gender that doesn't matter because boys aren't around to stare at you if you don't know something."

Brandy enjoys being in the single-sex classes at Clear Heights. She feels the classroom environment works for her learning style. If offered in middle school, Brandy thinks she would enroll in the single-sex classes.

Brandy's favorite subject is social studies, and her least favorite subject is writing. In thinking about her single-sex classroom, Brandy reported being able to do group work

was helpful to her learning. She also likes being able to have some choice in the activities in math and reading such as being able to learn on the iPad or computer. Brandy also noted that having opportunities to talk to others and sometimes work as a peer teacher really helped her feel secure in learning information.

Brittany

Brittany is a ten-year-old Caucasian female enrolled in the single-sex class at Clear Heights. Her parents are divorced, and she lives with her mother and her seven-year-old brother. Brittany likes cheering and tumbling classes when she is not in school. Brittany was enrolled in the single-sex class as a fourth grader, but prior to fourth grade, Brittany attended school in another town in Rose School District.

Brittany considers herself a good reader because she understands well and reads on a high level for her age. However, she admits reading in front of others makes her nervous. Brittany thinks she is a good writer because she is very detailed in writing stories. Brittany said, "Math is my favorite subject, and I have never gotten lower than 96 on my report card in math. I also teach my brother math because he struggles with it."

Brittany stated reading and language arts were not her favorite subjects, but she, "absolutely loves math." In the single-sex classroom, Brittany stated, "I like to talk and being the peer teacher in math is a good way for me to be certain of what I know." Brittany noted using technology and being able to write in all subjects are also helpful to her learning.

Brittany said that she likes the single-sex class but sometimes feels there is too much drama with girls. Brittany admits that were single-gender offered in middle school, she would not enroll.

Erin

Erin is a ten-year-old Asian American girl in the single-sex class at Clear Heights. She lives with her mother, father, grandfather, and brothers ages one, two, and three. Outside of school, Erin enjoys playing video games and soccer. She also participates in Korean and Cambodian dancing. Erin attended Clear Heights in the fourth grade single-sex class and has always attended school in the Rose District.

Erin considers herself a good reader. She stated, "Sometimes I stumble on words, but I comprehend well." Erin also thinks she is a good writer because other people find her writing interesting. Erin doesn't believe she is a good math student.

Erin stated reading is her favorite subject, but math is her least favorite subject. Erin noted it is helpful to her to be able to work in partners and discuss subject matter because she has strong verbal skills. Using technology and being able to respond to Ms. Bryant's questions on the computer or iPad is a learning strategy Erin likes. She also likes being able to do hands-on experiments in science and being able to role play in social studies.

Erin enjoys being in the single-sex classes. She thinks the friendships developed are good for her. If offered in middle school, Erin thinks she would enroll in the single-sex classes.

Calm Brook Males

Timothy

Timothy is a ten-year-old Caucasian male in the fifth grade at Calm Brook Elementary School. He will be 11 years old soon. Timothy lives with his mother, father, and younger brother age 9. Timothy's interests include soccer, football, playing on the

iPod on a rainy day, and spending time with friends. Timothy has attended Calm Brook since beginning kindergarten there.

Timothy considers himself a pretty good reader because he can pronounce words, read fluently, and "I get interested in a lot of books." When asked if he is a good writer, Timothy responded, "Kind of." He thinks he has good hooks for stories, but he doesn't write often. He stated that when people read his stories they tell him they are interesting. Timothy thinks he is a good math student because he understands most concepts well. He also stated he is always trying to do well in math and that math was his favorite subject. Language arts is Timothy's least favorite subject.

Regarding learning in the single-gender environment, Timothy stated the way the teacher teaches math is really helpful to his style of learning. He said, "The teacher turns everything into a story or connects it to real life. If we are adding, she will turn it into something that happened in class a few days ago. Timothy noted science and social studies lessons are taught much like math in that the teacher connects the information to what is going on right now. He said, "She will make an event into a reality series for us." In reading, Timothy said the teacher helps them know what to expect before the lesson. He said, "Ms. Wright says, it will be challenging so get ready."

When asked what he likes about single-gender, Timothy replied, "I can be around all my friends. Sometimes girls can be a little dramatic. It's just a little different without girls in single-gender." Timothy really could not comment on anything he dislikes about single-gender classes. Timothy thinks if single-gender were offered in middle school, he would participate.

Michael

Michael is an eleven year old Caucasian male in the fifth grade at Calm Brook Elementary School, who has attended the same school since kindergarten. He lives with just his mom and has one younger brother who is four-years-old. Outside of school, Michael likes to play club soccer and is also taking tennis lessons. He is not sure whether he likes tennis or soccer more. He also likes to play outside a lot.

When asked if he is a good reader, Michael replied, "I'm average." Michael thinks he doesn't do well with pronouncing big words, but he likes to read good mystery stories. Michael thinks he can write interesting stories, but he does not like to write. He also feels he is an average math student because he is not good at doing fast facts tests.

In looking at the academic aspects of being in single-sex classes, Michael talked about how the teacher teaches to help him learn. Science is Michael's favorite subject, and math is his least favorite subject. Michael stressed how visual methods are helpful to him. He said, "In math the teacher draws pictures and solves the problem so we can see what is done in a visual way. But this is kind of weird because I am auditory learner." The researcher asked Michael if Ms. Wright talked with the students about their learning styles, and he said that she did, but he knew his learning style because of a test the school counselor gave to all the students to help them recognize their learning styles.

Michael likes how the teacher leads book clubs based on the student reading level. He also likes that in social studies and science they have opportunities to write some days and other days they do not. He said, "The variety helps to keep things different."

Michael cannot think of anything he doesn't like about single-sex classes. He stated "All boys kind of think alike so when something gross is shown on the promethean

board, we all think it is cool and there isn't a lot of screaming and yelling." If single-sex classes were offered in middle school, Michael stated he would enroll.

Ryan

Ryan is a ten-year-old Caucasian male. Ryan was home schooled for a few years before enrolling at Calm Brook in third grade. Ryan lives with his mother, father, nine-year-old and four-year-old brothers as well as his seven-, five-, and two-year-old sisters. Outside of school, Ryan likes to play in the woods by the creek near his home. He also likes to play with his friend who lives across the street. He does not play in any organized sports.

Ryan believes he does well in all subjects, but his favorite is math because he thinks he does his best work in math. He also thinks he does well in writing because of the 'snapshot-think shot-dialogue' strategy he has learned in single-sex classes.

In looking at learning, Ryan stated his favorite subject is social studies, and his least favorite is math. He stated, "In class, Ms. Wright helps us solve and think about problems, but it just takes me a long time to solve them." He stated that learning the scientific method has helped him science, and he can learn social studies well because he just has to work on memorizing the facts. Ryan also mentioned he likes watching videos in social studies.

Ryan likes being in the single-sex classes. He stated, "We have more freedom and the teacher isn't very strict. We can get up on the cubbies and sit when it is our assigned day." Ryan also thinks if single-sex classes were offered in middle school he would participate. He said, "I think single-gender would be good for me because I think the teacher would understand boys as much as Ms. Wright does."

Eric

Eric is an eleven-year-old Hispanic male. He has moved several times and has attended three different schools in the same school district. He lives with his dad, mom, and three younger sisters. One sister is age nine and he has a set of five-year-old twin sisters. Outside of school, Eric likes to play with his friends. He mainly plays outdoor games like soccer, and he is not enrolled in any organized sports.

Eric doesn't believe he is a good reader or writer. He thinks he needs to "read more and focus on the book." He also thinks he needs to work on really understanding what is going on in the book. Eric also stated "Math is confusing for him because he does not understand how to do things."

In the classroom, Eric thinks having manipulatives helps in math although he stated math was his least favorite subject. Science is Eric's favorite subject. Eric likes doing experiments to help him learn science. He also likes role play activities in social studies. He stated, "Sometimes we do work and pretend to get money in social studies." Eric thinks experiments and role play help him learn the information better than just reading.

Eric likes being in the single-sex classes. He stated he likes having boys as friends and being able to get to know them. There isn't anything about single-gender Eric doesn't like, and he would enroll in single-gender again if he had the chance in middle school.

Clear Heights Males

Lyles

Lyles is a ten-year-old Caucasian male enrolled in the single-sex males' class at Clear Heights Intermediate School. Lyles lives with his mother, father, and two brothers ages nine and 12. Outside of school, Lyles enjoys playing baseball, and his dad is one of the coaches. He was enrolled in single-sex classes as a fourth grader, and has attended school in the same school district throughout elementary school.

Regarding his reading ability, Lyles considers himself above average. He stated, "I can read at a seventh grade level, so I think I am good at reading. " Lyles thinks he is an average math student. He said, "I'm not all Einstein at math, but I'm pretty good at it." Lyles believes he is above average in writing because he stated, "I have a wild imagination and I can think out of the box."

In the classroom, Lyles' favorite subject is social studies, and his least favorite subject is language arts because he said, "While I have good ideas, writing makes my hand hurt and we have to write a lot." Lyles thinks being able to interact with live animals and other manipulatives in science is important. He also thinks using manipulatives in math helps his learning. Lyles stated he likes to talk so he enjoys working with partners in all subjects.

Lyles likes the single-sex experience because he can relate to males his own age. He thought he really did not have much in common with girls and preferred not to interact with them in the classroom. He also thought if single-sex classes were offered in middle school, he would enroll.

Benjamin

Benjamin is a ten-year-old Caucasian male in the single-sex males' class at Clear Heights. Benjamin lives with his father, mother, and brothers ages six and 12. When Benjamin is not at school, he likes to play with his friends and to work as a member of the pit crew for his granddad who is a dirt track racer. Benjamin was in single-sex classes as a fourth grader and has attended school in the same school district since kindergarten.

Benjamin believes he is a good reader because he thinks reading is fun and because "I read at a high level." He also thinks he is a good writer because he has a big imagination and knows how to add details. Benjamin believes his math ability is average, and he reports he has always had good grades in math on his report card. Benjamin thinks he is a "good student" overall because he is in the Junior Beta Club.

Regarding the classwork, Benjamin stated his favorite subject is science, and his least favorite subject is social studies. He stated he really enjoys doing hands-on science experiments. He also said, "Ms. Suber helps us connect with each other as boys and learn."

Benjamin has liked being in single-gender classes, and there isn't anything about the classes he dislikes or would change. He thinks that were the middle school to offer single-sex classes in sixth grade, he would enroll.

Paul

Paul is a ten-year-old African American male enrolled in the single-sex class at Clear Heights. He lives with his mother and grandmother. He has two sisters age 11 and a brother age 16 but they do not live in with him. Outside of school, Paul plays baseball

and is eager about the after school practices each day. Paul attended Clear Heights last year and was in the single-sex fourth grade class. Before the previous school year, he attended school in another town in Rose County.

Paul believes he is a good reader because he reads at home every day. Paul feels his handwriting is sloppy but he can "add lots of details to make his stories exciting." Paul thinks his math grades are improving since being in single-gender classes.

Paul's favorite subject is science, and his least favorite subject is language arts. He likes using the computer and the iPad to learn in class. Even though language arts is not his favorite subject Paul stated he likes it when Ms. Suber teaches the class reading by using visuals such as the pyramid plot diagram.

Paul likes being in the single-sex classes because he likes not having to be around lots of girls. He stated, "Ms. Suber understands boys and she keeps class interesting for us. He feels like if he has the chance in middle school, he will enroll in single-sex classes.

Kelly

Kelly is an eleven-year-old Caucasian male. His parents are divorced and he lives with his mother and his six-year-old sister. Kelly likes sailing in his free time, and he is not involved in any organized sports. Last year, Kelly was in the single-sex males' class as a fourth grader. Since kindergarten, Kelly has attended school in the same school district.

Kelly thinks he is a good reader because he is "in the top reading group." He also thinks he is a good writer because he is able to add lots of detail to his writing, and he has

good penmanship. Kelly believes he is a good math student because he gets good grades in math and he is in the advanced math club.

Kelly's favorite subject is math because he stated, "Math is easy for me." His least favorite subject is social studies. Kelly thinks using manipulatives in math and other visuals is good for helping him learn. He also likes that the students have opportunities to write in all subjects and use technology such as the iPad.

Kelly likes being in single-sex classes because the teacher teaches in the way the boys learn best. He believes he would enroll in single-sex classes in middle school.

Focus Group Data

Focus group data were used to answer research question three: 3)What gender-specific instructional strategies do fifth grade students in single-sex classes perceive as beneficial to their learning? At Calm Brook and Clear Heights, the researcher conducted one focus group with females and one focus group with males. Topics discussed included the instructional strategies the males and females found helpful to their learning, the academic subjects they preferred, and the factors about single-sex classes they liked or disliked. The students also discussed reasons why they would or would not participate in single-sex classes for another school year. The focus group data will be separated by school and by sex. Focus group questions are presented in Appendix E.

Calm Brook Females

Two of the four females listed reading as their favorite subject. One female's favorite was science, and one female's favorite was social studies. Conversely, one female each noted math, writing, science, and social studies as their least favorite subject.

The females had varying preferences on their favorite reading materials. Female protagonists in the story were important to the students, but not a must. Poetry was a favorite as well as mysteries such as Out of My Mind by Sharon Draper and suspense novels such as The Hunger Games and Mockingjay. Like the male students at their school, the females enjoy books that are parts of a series.

In looking at the classroom experience the females noted choice in seating and how to interact with the content were important. Wendy noted, "I like it when Ms. Beaty allows us to have some choice in our work because if I understand something well I can work ahead." The females also pointed to the use of partner work and technology as being helpful. Mary thought Edmodo and EdCanvas were important technology applications in the classroom. Google Earth and the iPad were also important to the females. Beth said, "Google Earth is important for learning about volcanoes and the continental shelf. When speaking, sometimes you really don't get it, but when showing a picture or video live, it (technology) really helps." The girls also felt like being able to work with a partner was not only an opportunity to socialize with others, but also to verbally express their thoughts and ideas.

Writing in all subjects played upon the girls' verbal strengths. Beth said, "In social studies, I write about what I have learned and this helps me focus on the information better." Cindy thought Ms. Beaty helped the girls extend their thinking by answering their questions with another question. She said," When the teacher answers a question with a question, we don't stop thinking. We feel we are smart and we understand subjects well."

The current school year is the Calm Brook females' first experience with single-sex, but their opinions on the experience were positive. Cindy stated, "I think it is easier in single-gender and you can learn better. You have girls and you learn similarly to them. With boys they don't have the same idea and you might learn differently from them. Beth stated, "Having other people in class who care about my ideas is good. They may be willing to try my ideas because they might work." Beth commented she is happy to be in a class with others who are open to hear what she has to say without arguing with her thoughts and ideas. The females were open to participating in a single-sex class if given the opportunity.

Clear Heights Females

During the focus group with the Clear Heights females, two females noted math as their favorite subject. One female's favorite was social studies and one female's favorite was reading. In looking at the least favorite subject, one female noted math, one female each noted science and social studies, and two females noted English language arts.

Like their counterparts at Calm Brook, the Clear Heights females found books with female protagonists to be interesting to them, and they had varied interests in topics. However, the females did like books with male protagonists. Mysteries such as The London Eye Mystery by Siobhan Dowd and The Graveyard of the Blake Hartley mysteries feature male protagonists. The females also spoke of liking books about nature.

Regarding instructional strategies, the females stated partner work was important to them. Brandy stated, "You can synergize and work together more. And as long as you have a girl partner, other girls won't think you like a boy because he is your partner."

The girls also felt partner work allowed them to express their thoughts and ideas in a non-threatening way. Technology was another important aspect of the single-sex classroom. Erica said, "We like using the iPad for math, and being able to use tablets for reading." The female students also liked being able to communicate with Ms. Bryant via interactive notebooks because the notebooks allowed them opportunities to write about their learning. Erin stated, "When I found out I was in single-gender I was so excited! With all girls I can focus better!"

The Clear Heights females had positive perceptions of the single-sex classroom experience. Of the four interviewed, all except one thought they would enroll in single-sex in middle school if given the opportunity. The one female who did not said she wasn't sure because she did not always enjoy the drama that comes with being with all girls. Brittany stated, "I have broken out of my shyness in single-gender because I have opportunities to speak and express myself without being embarrassed of having boys in the classroom." The girls spoke about having some classroom drama, but felt the positives in class outweighed the drama. Erin stated, "Sometimes you have to be the leader and step in and stop the drama from getting worse." Brittany also stated, "In the classroom because girls are problems solvers, we try to solve our own problems before having to get the teacher to fix it." Brandy said, "I like how we communicate easier and have fun rather than having a boy behind your back and thinking about whether or not he is staring at me." Erica stated, "I like single-gender because we feel more comfortable and we can communicate with each other better."

Calm Brook Males

During the focus group with the Calm Brook males, one male listed math as his favorite subject. Two males noted science as their favorite, and one male noted social studies. In looking as the least favorite subject, one male noted English language arts as his least favorite, and three males noted math as their least favorite.

Regarding language arts instruction, the males mentioned the importance of being able to read books with male protagonists. They all seemed to like books that are part of a series. One particular favorite was Gregor the Underlander by Suzanne Collins which is the first book in Underland Chronicles series. Eric said, "We read the Gregor book as a whole class, and we had a great time with that book." The male students also liked mysteries. They talked about how the mysteries had a lot of action with males of their same age, and this kept them focused on the plot. The Percy Jackson series and the Goosebumps series were also highlighted as being favorites.

The males spoke to other instructional strategies in class that were most helpful to them. They all spoke about the use of manipulatives and other hands-on materials in math, science, and social studies. Activities such as being able to role play a classroom economy were also considered helpful in cementing the academic content. Timothy noted, "When Ms. Wright connects the math to reality, it keeps me interested in the topic."

Flexible seating and choice in the means of completing their work was important to the boys. Michael stated, "In other classes, we never got to sit where we liked, but in single-gender when we do written work we get to choose our seats." Being able to choose

how to present projects was a strategy the male students seemed to like. The use of technology was also seen as important to the boys because of its highly visual nature.

The boys conveyed positive thoughts about being in the single-sex classes. Michael stated, "In our other classes, the teacher had to teach to how boys and girls learn best. In single-gender, Ms. Wright just has to focus on how boys learn. Ryan and Timothy both spoke to the single-sex environment being free of the drama that is sometimes associated with female students. Overall, the boys expressed pleasure with being in the single-sex class and felt they would choose single-sex classes if their school district were to offer them in middle school.

Clear Heights Males

Two males noted science as their favorite, one noted math as his favorite, and one noted social studies as the favorite. Conversely, two males noted social studies as the least favorite, and two noted English language arts as the least favorite.

Similarly to the males from Calm Brook, the Clear Heights males spoke of enjoying books with male protagonists and books that are parts of a series. One particular favorite was The Hatchet by Gary Paulsen which is a Newbery award book and also the first in a series of five. Other books the boys mentioned were the Diary of a Wimpy Kid, Brothers at Bat, and books by Beverly Cleary that feature the character Henry. The stories all have a main character who is an adolescent male.

Regarding instructional strategies, the males stated Ms. Suber works to build trust and a sense of community between the students. Benjamin noted, "During morning meeting, we share topics interesting to boys." He also noted that because the boys do not switch classes with another teacher, the boys are able to build a stronger bond with each

other. The boys also noted how Ms. Suber supports them outside of school. "She comes to our ball games and other events," said Paul.

Group work and choice were important to the males. Lyles stated, "Sometimes Ms. Suber lets us choose where we sit in the room." He also spoke about being able to work in small groups, but stated that sometimes if the assigned partner wants to "goof off" then the other partner has to do most of the work. Kelly stated, "The small groups are helpful in math especially if you don't understand something. Your partner can teach you and help you learn. The boys also agreed that work including visualization and hands-on activities in important. "In reading," Paul said, "we did the plot pyramid which helped us understand the plot in a story." Benjamin stated, "Ms. Suber lets us do hands-on activities. In science, we use the hand lens to examine objects and we use graduated cylinders." Technology use in all subjects was a component of single-gender the Clear Heights males felt important to their success in the classroom.

The males are all in their second year of single-sex classes, and they all expressed liking single-gender over coeducational. Benjamin stated there is not as much drama in single-gender as there was in the coeducational class. He stated, "Everyone connects in some way because we are all boys." Kelly, Benjamin, and Paul thought boys tend to work together better when girls are not a part of the mix. Paul stated, "In single-gender class, you don't hear screams every time a spider shows up in the classroom like in coeducational classes." The boys didn't note anything in particular they disliked about the single-sex experience. However, Benjamin felt at times it is a little louder than coeducational classes. Paul stated, "If the teacher tells us to be quiet, it is kind of hard to get everyone settled down and quiet." Overall, the males' spoke of positive experiences

in the single-sex classes and thought they would enroll in single-sex classes in middle school if given the opportunity.

Achievement Data

To address the fourth question: 4)Is there evidence that males and females achieve at higher levels when separated by gender than when in coeducational classrooms environments a quantitative method was used. Both Calm Brook and Clear Heights schools administer the Measures of Academic Progress (MAP) in reading and mathematics to students in fifth grade. The principal at each school provided historical test data. Students take the reading and math portions of the test in the fall and again in the spring of each school year. After calculating students' fall Rasch Unit (RIT) scores, the MAP testing program generates a target RIT score for the spring administration of the test. According to the Northwest Education Association (NWEA) which develops MAP, students who meet or exceed the target RIT score are considered to have met one year's academic growth.

The researcher looked at two years of historical data of the percentage of students in coeducational and in single-gender classes who met the one year's growth target. The findings are presented in Tables 4.14, 4.15, 4.16, and 4.17.

Table 4.14

Females Meeting Reading Growth Target

School	Single-Sex Classes		Coeducational Classes	
	Percentage	*n*	*Percentage*	*n*
Calm Brook	30.0	41	36.8	33
Clear Heights	60.0	175	46.25	100

Table 4.15

Males Meetings Reading Growth Target

School	Single-Sex Classes		Coeducational Classes	
	Percentage	*n*	*Percentage*	*n*
Calm Brook	28.6	42	30.0	40
Clear Heights	55.5	150	53.8	98

Table 4.16

Females Meeting Mathematics Growth Target

School	Single-Sex Classes		Coeducational Classes	
	Percentage	*n*	*Percentage*	*n*
Calm Brook	50.0	41	31.6	33
Clear Heights	67.4	175	69.5	100

Table 4.17

Males Meeting Mathematics Growth Target

School	Single-Sex Classes		Coeducational Classes	
	Percentage	*n*	*Percentage*	*n*
Calm Brook	57.1	42	45.0	40
Clear Heights	64.25	150	51.5	98

Chapter 5

Analysis, Discussion, Conclusions, and Recommendations

Introduction

As reported in the Chapter One, the purpose of this study was to review the research on gender-specific instructional strategies, determine if these strategies are being implemented in single-sex education programs, and determine student perceptions of the benefit of gender-specific strategies. The study sought to address the presence of evidence of teachers adjusting instructional delivery based on whether they are teaching single-sex or coeducational classes; study the types of gender-specific instructional strategies implemented and which strategies the students consider beneficial to their learning; and to compare the achievement data of students in single-sex classes to students in coeducational classes. This chapter is organized in terms of the research questions. An analysis of each section of the data as it relates to each research question will be provided followed by a description of emerging themes. Finally, conclusions and recommendations for future study will be provided.

Analysis of Data

Question 1: Is there evidence that teachers adjust the instructional delivery based on whether they are teaching single-sex classes or coeducational classes? and Question 2: What gender-specific instructional strategies are being implemented in elementary

schools with fifth grade single-sex classes? To gain an understanding of whether teachers adjust content delivery strategies based on whether or not they teach coeducational or single-sex classes, the researcher first reviewed gender-specific strategies as espoused by Sax (2005), Chadwell (2010), and Gurian et al. (2009). The research provided pointed to differences in social and emotional factors, sensory needs, the physical classroom environment, the delivery of academic content, and extracurricular activities between males and females.

In looking at the presence of gender-inclusive strategies, the researcher found the strategies were woven into the instruction in the single-sex and coeducational classes. Technology integration was seen most often as evidenced by the presence of some form of technology in 23 of 24 observations. Partner work was seen in six of the single-sex observations but in only about four of the coeducational observations.

The gender-specific strategies vary in accord with the brain-based learning styles of males and females. The strategies are present in the areas of sensory integration, the physical and classroom environment, content delivery strategies, and extracurricular strategies. While there was evidence of gender-specific strategies in the single-sex classrooms, there were instances of gender-specific strategies being used in the coeducational environments.

Aspects of the classroom environment were modified to accommodate the specific needs of males and females. Evidence of flexible seating was seen in all of the single-sex classrooms. Flexible seating options such as using a card system for assigning seats and allowing students to choose their seats were seen in the coeducational settings.

Various instructional delivery strategies were employed to address male and female brain-based strengths. Visual timers and visually projecting directions for work were seen in the observations to meet the needs of male learners. Experiences with written and verbal communication were evidenced to meet the needs of female learners.

In the observations of the coeducational classes, there were instances of gender-specific content strategies being integrated. The use of timers, which is a male-friendly strategy were observed. In looking at reading instruction, there was a balance of male and female protagonists in the books selected. Competition in work, a male strategy was woven into the science instruction in Ms. Jackson's class at Clear Heights as was answering a question with a question, a female strategy. In Ms. Williams' class at Clear Heights, there were instances of classroom discussion conducted in pairs, which is a female strategy. Ms. Jackson integrated raps, rhymes, and musical into her coeducational class which plays to both male and female strengths.

In looking at the data regarding instruction in the single-sex and coeducational environments, several themes emerged.

- Teachers in single-sex and coeducational classes are weaving the gender-inclusive strategies into classroom lessons across academic content. While technology was integrated most often, other strategies were present as well.
- Teachers in the single-sex classes are implementing various gender-specific strategies across the areas of sensory integration, environment, content delivery, and extracurricular opportunities in the classes.
- Visually integrating instructions for work and student achievement data was seen across the single-sex and coeducational observations.

- Appropriate professional development in single-sex instructional strategies (Sax, 2006; Weaver-Hightower, 2003, Peterson and Fennema, 1985) impact learning and achievement. The classroom observations revealed that teachers can implement gender-specific strategies in the coeducational setting. Professional development in the pedagogical strategies should be provided if teachers are to implement the strategies.
- While gender-specific strategies were seen across the eight single-sex and coeducational classes, further study in additional classes is needed to determine if specific strategies are implemented consistently across the academic content and in all single-sex classrooms in the state.
- Many of the instructional delivery methods in a classroom can be attributed to human behavior. Changing how a teacher delivers instruction based on gender-specific strategies may not be easily changed especially if the teacher considers himself successful in the methods he is already using or if the teacher has difficulty changing from the way in which he learned in his teacher preparation. The researcher observed the teachers using several of the strategies regularly reflecting a particular comfort level with those. The researcher believes that in order to implement gender-specific strategies, professional development and pedagogical training have to been embedded in the school setting on a consistent basis. Simply attending a workshop on gender-specific strategies will not effectively change the teacher's delivery of the content.

Question 3: What gender-specific instructional strategies do fifth grade students in single-sex classes perceive as beneficial to their learning? To gain an understanding of

the gender-specific instructional strategies fifth grade students perceive as beneficial to their learning, a survey was administered. One version of the survey was specific to males and another version was specific to males (Appendices A and B). To gain additional information on the perceived benefit of instructional strategies, four males and four females from each school were interviewed once individually and once in a focus group.

To gain an understanding of the preferences males and females were asked several questions to determine their likes and dislikes regarding experiences in single-sex and in coeducational classes. In looking at the aspects of single-sex classes that the males and females considered important, the all-female or all-male learning environment and developing relationships with peers were ranked in the top two for males and females. Of the female respondents, 9.1% of them felt increased confidence was an important benefit of the single-sex environment. In looking at male responses, 10.5% rated the teacher having an understanding of male learning styles as important. Conversely the males and females were asked to look at aspects of coeducational classes that were negative and positive. Having the other sex in the classroom was rated negatively by males and females. Both males and females rated friendships and the teacher as being positive aspects of the coeducational experience.

Through the surveys, interviews, and focus groups, the students were asked their thoughts about the single-sex program and if they would consider enrolling in single-sex classes again. The females spoke of increased confidence in the single-sex classroom and being able to learn in a distraction free environment. The males spoke of being able to focus on learning as well as having teachers who understood their learning styles.

The survey, interview, and focus group data regarding student perceptions of the instruction implemented in the single-sex environment revealed several themes.

- Males and females in the program appeared confident in their abilities in reading, writing, and mathematics.
- Educators can use data from student preferences in learning styles to tailor instruction and engage learners.
- Males and females rated highly the positive aspects of single-sex classes and the negative aspects of coeducational classes related to social constructs such as friends, bullying, and distractions instead of the delivery of the academic content or gender-specific strategies. Hubbard and Datnow (2005) found that a positive teacher-student relationship and classroom structure have more impact on achievement than does separating students by sex. The researcher believes that additional research is needed to determine if the real impact of single-sex education is a social construct instead of making a significant impact on achievement.

Question 4: Is there evidence that males and females achieve at higher levels when separated by gender than when in coeducational classroom environments? Researchers report that differences in brain development impact student achievement. In looking at brain differences, (Gurian and Stevens, 2004) have found that differences in male and female academic achievement are present across industrialized nations. Research from the Organization for Economic Cooperation and Development reveals over 30 years of study in the United States, Canada, Japan and Europe where females achieve at greater levels than do males.

The researcher looked at two years of historical data of the percentage of students in coeducational and in single-gender classes who met the one year's growth target according to MAP. At Calm Brook, the reading achievement of males in single-sex and coeducational classes was comparable with coeducational males' achievement at 30% being slightly higher than that of single sex males at 28.6%. At Clear Heights, males in the single-sex classes performed slightly better than males in the coeducational classes with single-sex males' achievement at 55.5% meeting the growth target and 53.8% of males in the coeducational classes meeting the growth target.

The reading achievement of females in single-sex classes was better than that of females in the coeducational classes at both schools. At Calm Brook, 50% of the females in single-sex classes met their growth targets compared to 36.8% of females in the coeducational classes. At Clear Heights, 60% of females met their growth targets compared to 46.25% of females in the coeducational classes.

The mathematics achievement of males in single-sex classes was better than the achievement of males in coeducational classes at both schools. At Calm Brook, 57.1% of males in the single-sex classes met their growth target compared to 45% of males in coeducational classes. Similarly at Clear Heights, 64.25% of males in the single-sex classes met the growth target compared to 51.1% of males in the coeducational classes.

For females' mathematics achievement, 50% of females in the single-sex classes at Calm Brook met the growth target as compared with 31.6% of females in the coeducational classes. At Clear Heights, females in the coeducational classes performed slightly better than females in the single-sex classes. In the coeducational classes, 69.5%

of females met the mathematics growth target compared to 67.4% of females in the single-sex classes.

The data from Calm Brook and Clear Heights does not reveal that the single-sex environment provides increased achievement for males or females across the academic content. Additional historical data would be necessary to obtain a clear indication of the impact of single-sex classes on student achievement.

From the literature reviewed and the findings of the study, the researcher questions the true impact of single-sex education. Improving academic achievement for all students is the primary concern of educators. However, the findings from this work do not prove that single-sex education makes a substantial impact on the achievement gap. Based on these findings, the researcher questions the benefit of single-sex education considering the expense and that the real benefits that could be more social than academic. The researcher believes that teachers could implement gender-specific strategies in the coeducational setting and meet the needs of both sexes.

Recommendations for Best Practices in Schools

Previous research has focused on the differences in achievement between males and females. The research indicates that this achievement gap may be the result of biological and behavioral differences between males and females (Hunsader, 2002; King & Gurian, 2006; Gurian and Stevens, 2006; Martino & Kehler, 2006; 2007). Single-sex education in public schools was implemented under the *No Child Left Behind* legislation in 2006. While South Carolina is a leader in single-sex education, many other states and schools do not offer this program. The recommendations provided are to help educators acquaint themselves with differences in learning between males and females.

- Whether a school offers single-sex education or not, educators should participate in professional development to become aware and implement strategies to address the brain-based differences between males and females, learning styles and preferences of both sexes, and gender equity.
- Educators should analyze data on achievement and on discipline and social factors. Striving to determine the root of the achievement gap in a school is needed before implementing a single-sex program.
- Educators should closely analyze achievement data by gender in order to examine strengths and weaknesses. While analyzing alone will not impact the achievement gap, it will provide a starting point for determining areas of focus for improvement that may be based in programmatic ideals or teaching styles.

The researcher does see the benefit of an awareness of and implementation of gender-specific strategies. However, the researcher questions whether schools should implement single-sex education if there are not proven results for decreasing the achievement gap. There is significant cost associated with implementing single-sex education. With education budgets often cut drastically, the researcher questions if there are other ways to produce high achievement and an appropriate social setting that is less costly.

Recommendations for Future Studies

Question 1: Is there evidence that teachers adjust the instructional delivery based on whether they are teaching single-sex classes or coeducational classes?

- The content delivery is a function of human behavior. Future studies could look at instructional delivery in coeducational and single-sex classes over a longer time

period than this study. The researcher is concerned that over a longer time frame, instruction in the coeducational and single-sex classes may look similar.

Question 2: What gender-specific instructional strategies are being implemented in elementary schools with fifth grade single-sex classes?

- The research was conducted specifically with fifth grade students. Another study could be conducted with a different grade level.

Question 3: What gender-specific instructional strategies do fifth grade students in single-sex classes perceive as beneficial to their learning?

- The research looked at several gender-specific strategies. Further research could be conducted looking at what social constructs do students in single-sex classes find beneficial and if the students find more benefit in the social structure of the class than in how the teacher delivers the content.

Question 4: Is there evidence that males and females achieve at higher levels when separated by gender than when in coeducational classroom environments?

- The research was conducted looking at two years of historical data in two schools with single-sex education. Further research could be conducted to look at more data to see if achievement improves.
- The assessments that measure achievement could have gender-bias. A future study could look for the presence of gender-bias in assessments and determine if decreasing the bias would produce greater student achievement.

Major Themes and Final Conclusions

From the data collected four major themes emerged from the study.

- As supported by the survey, interview, and focus group data, male students preferred those instructional strategies that spoke to their visual-spatial and fine-motor strengths. Female students preferred those instructional strategies that spoke to their verbal and communication strengths.
- Males and females preferred the single-sex classroom environment. Females reported increased confidence in the single-sex setting, and male students reported teachers in the single-sex classes seemed to understand their learning needs better than in coeducational settings. However, additional data is needed to determine why the students find the social aspects of single-sex appealing and if the coeducational environment can be modified to make it more appealing socially.
- There is evidence that in single-sex classes, teachers do implement gender-specific strategies across the curriculum. However, with the appropriate professional development, teachers can implement them effectively in coeducational settings.
- There isn't conclusive evidence that the single-sex environment provides an advantage in achievement over the coeducational environment. Additional review of achievement data over time is needed to determine if single-sex education positively impacts the achievement gap.

Evidence of educators implementing gender-specific strategies to meet student preferences and learning styles was observed. Data also revealed that males and females found the single-sex environment helpful and were more confident in their abilities.

However, the data did not prove that single-sex education had a significant bearing on the achievement gap. Consequently, the researcher is believes that if achievement does not improve, educators should conduct further study to determine the real benefit of single-sex education. The critical idea for contemplation is that if the real impact of single-sex education is increased confidence and social wellbeing, is it worth the cost to pursue it without academic value and increased student achievement.

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Appendix A
The University of South Carolina School of Education
Parent Permission Form
Study Title: Gender Specific Instructional Strategies in 5th Grade Single-Sex Classes in South Carolina Elementary Schools
Millicent Whitener Dickey, Principal Investigator

August 1, 2013

Dear Parent or Guardian:

As a doctoral student in the department of Educational Leadership and Policies at the University of South Carolina, I am currently involved in the dissertation phase of my program. The focus of my research highlights the learning experiences of male and female students in single-gender classrooms.

The purpose of my study is twofold. First the study will seek to determine whether the instructional practices and delivery of the content in a single-gender classroom environment differ from those in a coeducational classroom environment. Secondly, the study seeks to uncover those practices that male and female students perceive as most beneficial to their learning and achievement.

Male and female students in the single-gender classes will be interviewed. The interview will center on the students' perceptions of the single-gender experience.

All participants for this study will remain anonymous and any identifying information shared during the interview sessions will not be disclosed. The questions will center on the participants' perceptive of learning, achievement, and single-gender classes. Some of the questions asked will be. .

- What are your thoughts on the single-gender classroom experience?
- Would you consider yourself to be a good reader? Why would you say this about yourself?
- What makes this class different than other classes you've had?

Each of the participants for the case study portion will be interviewed one time. As well, one focus group with all four males and another focus group with all four females will be conducted. The surveys and interviews will be conducted during September 2013. As interviews are conducted and transcribed, the interviews will be read and coded as a way to identify common, emerging themes. The data collected from these interviews will help to determine whether a single-gender environment differs from a coeducational

environment and will seek to determine the instructional strategies that students in single-gender classes perceive to be most beneficial to their learning.

If you would like additional information concerning my research or your child's involvement in my study, please feel free to contact me at millicent.dickey@clover.k12.sc.us or at 704.408.8434.

I appreciate your consideration of this request.

Sincerely,

Millicent Whitener Dickey

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Student Name:_____

___I give my permission for my child to be involved in this research study.

___I do not give my permission for my child to be involved in this research study.

Parent Signature:_____ Date:_____

Appendix B

Single-Gender Student Survey-Females

- What do you consider important about being in a single-sex classroom?

- Would you consider yourself to be a good reader? Why would you say this about yourself?

- What makes this single-gender class different than other classes you've had?

- What are your favorite subjects in school? (For example—math, science, social studies, language arts, music, physical education, art, computer lab)

- What are your least favorite subjects in school? (For example—math, science, social studies, language arts, music, physical education, art, computer lab)

- What have you **disliked** about the classes you had **before this year**?

- What have you **liked** about the classes you had **before this year**?

- How would you rate yourself as a reader? Please circle one.

Below average Average Above average

- How would you rate yourself as a writer? Please circle one.

Below average Average Above average

- How would you rate yourself as a mathematician? Please circle one.

Below average Average Above average

- What do you think you need to do to become a better reader?

- What do you think you need to do to become a better writer (not handwriting or penmanship)?

- What do you think you need to do to become a better math student?

Please rate the use of the following activities in your classroom with 1 being not helpful to your learning and achievement and 3 being very helpful to your learning and achievement. Please circle one for each question.

Gender Inclusive Strategies:

Working with a partner or group to complete class work

1—Not helpful to my learning 2—Somewhat helpful to my learning

3—Very helpful to my learning

Having problem solving activities in subjects

1—Not helpful to my learning 2—Somewhat helpful to my learning

3—Very helpful to my learning

Technology used in all subjects

1—Not helpful to my learning 2—Somewhat helpful to my learning

3—Very helpful to my learning

Sensory Strategies:

The teacher changes the tone of his/her voice so as not to sound angry

1—Not helpful to my learning 2—Somewhat helpful to my learning

3—Very helpful to my learning

A quiet work area is provided in my classroom

1—Not helpful to my learning 2—Somewhat helpful to my learning

3—Very helpful to my learning

Physical Environment:

A cozy reading area with pillows and comfy chairs is available in my classroom

1—Not helpful to my learning 2—Somewhat helpful to my learning

3—Very helpful to my learning

Seating assignments are rotated often and before the class starts

1—Not helpful to my learning 2—Somewhat helpful to my learning

3—Very helpful to my learning

Content Delivery Strategies:

Teachers answer questions I ask with a question

1—Not helpful to my learning 2—Somewhat helpful to my learning

3—Very helpful to my learning

Math lessons involve movement (For example jumping rope)

1—Not helpful to my learning 2—Somewhat helpful to my learning

3—Very helpful to my learning

Journals and word games are used in math, science, and social studies

1—Not helpful to my learning 2—Somewhat helpful to my learning

3—Very helpful to my learning

Students have a chance to write daily

1—Not helpful to my learning 2—Somewhat helpful to my learning

3—Very helpful to my learning

Few questions about the directions are allowed before beginning work

1—Not helpful to my learning 2—Somewhat helpful to my learning

3—Very helpful to my learning

Questions are asked frequently to help me understand what I am learning

1—Not helpful to my learning 2—Somewhat helpful to my learning

3—Very helpful to my learning

Classroom discussions are done in pairs and small groups

1—Not helpful to my learning 2—Somewhat helpful to my learning

3—Very helpful to my learning

Role play in done in science and social studies

1—Not helpful to my learning 2—Somewhat helpful to my learning

3—Very helpful to my learning

Extracurricular Strategies:

Role models in fields of work not typical for females are included in extracurricular activities and learning (For example, women in engineering jobs)

1—Not helpful to my learning 2—Somewhat helpful to my learning

3—Very helpful to my learning

Extracurricular experiences provide chances to connect learning to the real world (For example field trips)

1—Not helpful to my learning 2—Somewhat helpful to my learning

3—Very helpful to my learning

Leadership opportunities to connect with women role models are provided

1—Not helpful to my learning 2—Somewhat helpful to my learning

3—Very helpful to my learning

Appendix C

Single-Gender Student Survey-Males

- What do you consider important about being in a single-sex classroom?
- Would you consider yourself to be a good reader? Why would you say this about yourself?
- What makes this single-gender class different than other classes you've had?
- What are your favorite subjects in school? (For example—math, science, social studies, language arts, music, physical education, art, computer lab)
- What are your least favorite subjects in school? (For example—math, science, social studies, language arts, music, physical education, art, computer lab)
- What have you **disliked** about the classes you had **before this year**?
- What have you **liked** about the classes you had **before this year**?
- How would you rate yourself as a reader? Please circle one.

Below average Average Above average

- How would you rate yourself as a writer? Please circle one.

Below average Average Above average

- How would you rate yourself as a mathematician? Please circle one.

Below average Average Above average

- What do you think you need to do to become a better reader?
- What do you think you need to do to become a better writer (not handwriting or penmanship)?
- What do you think you need to do to become a better math student?

Please rate the use of the following activities in your classroom with 1 being not helpful to your learning and achievement and 3 being very helpful to your learning and achievement. Please circle one for each question.

Gender Inclusive Strategies:

Working with a partner or group to complete class work

1—Not helpful to my learning 2—Somewhat helpful to my learning

3—Very helpful to my learning

Having problem solving activities in subjects

1—Not helpful to my learning 2—Somewhat helpful to my learning

3—Very helpful to my learning

Technology used in all subjects

1—Not helpful to my learning 2—Somewhat helpful to my learning

3—Very helpful to my learning

Sensory Strategies:

High levels of noise allowed while working

1—Not helpful to my learning 2—Somewhat helpful to my learning

3—Very helpful to my learning

Instructions for completing work given visually (For example, directions on the promethean board)

1—Not helpful to my learning 2—Somewhat helpful to my learning

3—Very helpful to my learning

Physical Environment:

Males are allowed to sit, stand, or lay on the floor to do work

1—Not helpful to my learning 2—Somewhat helpful to my learning

3—Very helpful to my learning

Classroom is clutter free

1—Not helpful to my learning 2—Somewhat helpful to my learning

3—Very helpful to my learning

Increased space for movement is provided

1—Not helpful to my learning 2—Somewhat helpful to my learning

3—Very helpful to my learning

Content Delivery Strategies:

Books are available on topics of interest to males

1—Not helpful to my learning 2—Somewhat helpful to my learning

3—Very helpful to my learning

Skits/role play are used

1—Not helpful to my learning 2—Somewhat helpful to my learning

3—Very helpful to my learning

Games used in lessons

1—Not helpful to my learning 2—Somewhat helpful to my learning

3—Very helpful to my learning

A quick pace is maintained in the lesson

1—Not helpful to my learning 2—Somewhat helpful to my learning

3—Very helpful to my learning

Subjects are taught in small chunks

1—Not helpful to my learning 2—Somewhat helpful to my learning

3—Very helpful to my learning

Manipulatives are used to teach math (For example, unifix cubes for a math lesson)

1—Not helpful to my learning 2—Somewhat helpful to my learning

3—Very helpful to my learning

Hands-on materials are used for science, social studies, and language arts lessons (For example, pictures or other small objects)

1—Not helpful to my learning 2—Somewhat helpful to my learning

3—Very helpful to my learning

Brain characteristics are talked about in relation to the lesson being studied

1—Not helpful to my learning 2—Somewhat helpful to my learning

3—Very helpful to my learning

Timers are used for completion of work

1—Not helpful to my learning 2—Somewhat helpful to my learning

3—Very helpful to my learning

The teacher tells me what I am going to learn before the lessons starts

1—Not helpful to my learning 2—Somewhat helpful to my learning

3—Very helpful to my learning

Extracurricular Strategies:

Role models serve as speakers on school and social topics

1—Not helpful to my learning 2—Somewhat helpful to my learning

3—Very helpful to my learning

Adult males serve as guest for read-ins and other school activities

1—Not helpful to my learning 2—Somewhat helpful to my learning

3—Very helpful to my learning

Appendix D

Single-Gender Student Interview Questions

1. What is your name?
2. What is your age?
3. Who is in your family/who do you live with?
4. What are your interests outside of school?
5. Would you consider yourself to be a good reader? Why or why not?
6. Would you consider yourself to be a good writer? Why or why not?
7. Would you consider yourself to be a good math student? Why or why not?
8. What is your favorite book/author?
9. What do you like about single-gender classes?
10. What do you dislike about single-gender classes?
11. If single-gender were offered in 6th grade, would you participate in/enroll in single-gender classes?

Appendix E

Single-Gender Student Focus Group Questions

1. What do you like about single-gender classes?
2. What do you dislike about single-gender classes?
3. How is single-gender class different than coeducational class?
4. How is single-gender the same as coeducational class?
5. What does the teacher do (lessons/activities) that is helpful to how you learn?
6. What does the teacher do (lessons/activities) that is not helpful to how you learn?
7. What perceptions did you have about single-gender class before you started in the class?
8. Were those perceptions true?