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An Analysis of Achievement Between Single Gender Education and Coeducational Models in Select Middle Schools in South Carolina

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An Analysis of Achievement Between Single Gender and Coeducational Models in
Select Middle Schools in South Carolina

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2013

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Dedication

I would like to dedicate this dissertation to four very special ladies in my life who have had a profound impact on this project.

For my wife, Lynne, thank you for the constant support and encouragement to “hang in there” even when it meant writing and studying instead of doing fun things with you. You have always been there to help me, support me, and refocus me in whatever has come our way. You are truly my best friend and I cherish our journey together.

For my daughters, Lauren and Lydia, for showing me there are different ways we think and reason through issues. You are the reasons I became interested in beginning this process as a means of providing a model of scholastic achievement for you to follow. Please know that you are special and can do anything you set your mind to and persevere with.

Finally, for my mother who left us too soon. You always wanted a doctor in the family. You showed me what toughness was in a kind and gentle way. I wish you could be here to see how far I have come over the years even though you would say you were not surprised.

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Thank you to the faculty of Northwest Middle School. For many years we worked together to make a difference in children’s lives. You were there for me many times.

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Abstract

The purpose of this study was to examine the effect of single gender education on the overall academic achievement of students in reading and mathematics. Four research questions, focused on math and reading assessment scores, were developed to guide the study. The research was focused on the results of the Measures of Academic Progress assessments administered to students each academic year. The population of student scores selected to be studied were those of seventh grade students in two middle schools in the Upstate of South Carolina. The reason for studying this grade level was due to the fact that it was the common grade in which each school had implemented a single gender program. The Levene's test for Equality of Variances was conducted to evaluate the assumption of whether the population variances for the two groups are equal. An analysis of the data was conducted using independent samples t-tests. The results showed no statistically significant difference between mean math and reading scores of female students in single gender classes compared to those in coeducational classes. Likewise, the results also showed no statistically significant difference between mean math and reading scores for male students in single gender classes compared to male students in coeducational classes.

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Chapter One: Introduction

The responsibility for educating young Americans is left to the individual states by virtue of its absence in the Constitution of the United States of America. However, the federal government has taken an assertive role in education improvement through the use of federal laws and mandates aimed at impacting academic achievement for all students through Public Law 107-110, better known as The Elementary and Secondary Education Act (ESEA), and currently known as No Child Left Behind (NCLB). The federal government has been able to insert itself into education issues through the use of funding sources such as Title I and the federal lunch program. States and districts have come to rely so heavily on the infusion of these funds they are obliged to comply with the accompanying mandates or risk the loss of the funds. The stated purpose of NCLB is to “ensure that all children have a fair, equal, and significant opportunity to obtain a high-quality education and reach, at minimum, proficiency on challenging state academic standards and state academic assessments” (United States Congress, 2002, Section 1001).

The accountability afforded by NCLB encourages educators to seek differing means to assist children in reaching proficient levels. Under the law, schools, districts, and states are “held accountable for improving the academic achievement of all students and turning around low-performing schools that have failed to provide a high-quality education to their students...” (United States Congress, 2002, Sec. 1001.4). The

accountability component of the law makes a compelling reason for educators to demonstrate student achievement increases annually for every student.

NCLB also provides the opportunity for, and encourages, educators to provide “effective, scientifically based instructional strategies...” (United States Congress, 2002, Sec 1001.9). The law does not specify individual programs aimed at student achievement, rather the decision, as to which programs to implement, is left to the schools, districts, and states. The requirement for research based instructional strategies opens the door for districts to implement single gender education in classrooms. Both the accountability and the opportunity involved with NCLB make a compelling reason for research to explore the study of single gender education to either prove, or disprove, the strategy and an effective means of improving scholastic proficiency for all students.

For most of the history of modern education, schools and educators have been prone to ignore the genetic differences between male and female students. There are numerous cases of female students challenging the status quo by participating on football, wrestling, and soccer teams. The rise in female participation in predominately male activities is one result of the public outcry over women’s equality during the 1960’s and 1970’s resulting from the women’s liberation movement and calls for equal opportunity between the sexes.

Additionally, educators have been subjected to a rise in the number of boys who are unsuccessful in the classroom causing an increase in the prescribing of medications aimed at addressing Attention Deficit Disorders (ADD) and Attention Deficit Hyperactivity Disorders (ADHD). According to the Centers for Disease Control and Prevention (CDC), boys are “more likely than girls to be diagnosed with ADHD,

Learning Disabilities, or a combination of both” (Pastor and Reuben, 2008, p.1). In the United States today approximately eleven percent of children are diagnosed with ADHD and rates of prescriptions for these children have increased dramatically during the 1990’s and 2000’s (LeFever, Arcona, and Antonuccio, 2003, Park, 2013, Schwarz and Cohen, 2013). The CDC reports twelve percent of South Carolina school children ages four to seventeen have been diagnosed with ADHD (LeFever, Arcona, and Antonuccio, 2003). Problems arise when boys and girls enter school and educators attempt to teach boys and girls using the same methodologies. Because of a renewed level of accountability, schools and districts are facing scrutiny over the student achievement levels of their students. Throughout the years, educators have had many professional development opportunities aimed at increasing students’ achievement through one program or another. During this time, the achievement of girls has steadily risen, as evidenced by the greater number of girls enrolling in college (Slocumb, 2004). In many high schools, often the valedictorian is a female student. Educators need to ask if we are shortchanging boys or if the girls have simply caught up.

Due to NCLB, single gender education, in public schools, is gaining in popularity once again after a very long hiatus due in part to the implementation of federal Title IX regulations. In 1972, the federal government passed Title IX in an effort to promote the education and extra-curricular equality of female students, thereby placing them on a level plane with male students. The law, as interpreted by the Office of Civil Rights, made the separation of boys and girls in schools receiving federal funds illegal (Salomone, 2006) (Mael, 1998).

Educators should realize what they consider as traditional coeducational classes were not the norm when the country was founded. A review of history shows the first colleges in the United States began as single gender schools; Harvard, Yale, and Princeton (Bradley, 2007). With the societal changes and the need for more workers, the introduction of co-educational classes began in the early 1800's. Still, it was not uncommon to find schools separating the sexes for instructional purposes into the twentieth century. The groundswell of support for equal rights in the 1960's led to the implementation of Title IX which effectively halted the separation of genders in public schools.

With the reauthorization of the Elementary and Secondary Schools Act in 2001, more commonly known as No Child Left Behind (NCLB), the call for improved student achievement has forced both theorists and practitioners to re-examine how services are provided to students (United States Congress, 2002). NCLB calls on schools and districts to improve education so that all students may meet a minimum set of benchmarks in each grade. The increased accountability levels called for by NCLB have brought about the increased interest in single gender classes around the country. In 2006, President George W. Bush endorsed single gender education as a potential strategy for helping schools to meet the requirements of NCLB (Bradley, 2006).

Prior to President Bush's endorsement of single gender classes; public schools, public school districts and states were able to apply single gender education in limited curriculum areas (Adcox, 2007). Private and parochial schools were not impacted by the endorsement of single gender education due to the fact they were independent of the states and federal governments. The Single Sex Academy (SSA) opened in California in

1999 after winning approval to become the largest single gender education experiment in the country (Herr and Arms, 2004). In 2002, the United States Department of Education requested public comment concerning possible changes to Title IX in respect to athletics due to the possibilities for increasing single gender education along the way (Davis, 2004). The comments sought were a precursor to changes being sought pertaining to the allowance of single gender programs in schools receiving federal funds which could be in violation of the requirements of Title IX regulations. With the approval of President Bush and the United States Department of Education, schools and districts began to implement single gender programs in earnest.

In 2004, South Carolina's Dent Middle School, in Richland School District Two, became the first public school to gain approval to provide single gender classes in the state (Adcox, 2007). South Carolina eventually became the national leader in single gender programs resulting in establishment of an Office of Single Sex Education at the state level with a senior director position to oversee the development of single gender programs throughout the state. The staff level post for single gender initiatives was the first such post of any state in the country (Adcox, 2007). Other states, such as Tennessee, began single gender programs aimed at helping students who traditionally have the highest dropout rates improve their chances of success (Davis, 2004).

The idea of providing single gender education in public schools is championed by many and opposed by a like number. The proponents of single gender classes argue that separating the sexes allows each to be taught in a manner meeting his or her gender related learning styles (Sax, 2005, James, 2004, Gurian, 2001, Tyre, 2005). Opponents argue the idea of single gender classes re-segregates schools and diminishes the progress

made by females since the inception of federal Title IX regulations (Gandy, 2006, Sadker and Zittleman, 2005, American Civil Liberties Union, 2007). Advocates of single gender education, as well as those who oppose it, are able to cite studies and statistics to support their positions.

Purpose of the Study

The purpose of this study was to examine the effect of single gender education on the overall academic achievement of students in reading and mathematics.

Many differences exist between the genders leading to questions concerning how to best utilize and acknowledge these differences to the best advantage. The study of the literature revealed examinations of four areas of relevance to the study; single gender perspectives, gender differences, social aspects, and scholastic achievement.

Should educators separate the genders and build on their strengths in order to influence academic achievement? In this study, the theory behind single gender education was reviewed, with gender differences in the classroom as a focal point. From genetic makeup, research has discovered there are differences between males and females that dictate emotions, thoughts, and learning styles.

Boys enter middle school age and puberty with confusion about their emotions and behavior because of increased levels of testosterone which is the “sex-aggression hormone” (Gurian, Henley, & Trueman, 2001, p.205). With their bodies changing, their lack of verbal skills and ever changing emotions, some boys often find it difficult to focus on academics. Given the confusion experienced by boys, they may suffer academically while trying to understand the changes going on within their bodies and minds. Thus,

“boys learn self-management, and find safety in working with others who understand them” (Gurian, Henley, & Trueman, 2001, p.207).

In *Why Gender Matters*, the differences between the male and female brain are explained by the examination of how the “functions (of the brain) are more compartmentalized in male brains and more globally distributed in female brains” (Sax, p.12). Another interesting difference discovered between the male and female brain is the research suggesting the brain tissue itself varies according to gender (Sax, 2005).

Because males have the Y chromosome, scientists have found that “many areas of the male brain are rich in proteins that are coded directly by the Y chromosome” (Sax, p.14). Brain research shows that female brains do not possess the same types of protein due to the lack of the Y chromosome. Researchers have studied brain tissue and have been able to determine differences in the tissue samples, allowing them to correctly differentiate tissue from male and female brains (DeFillipe, 2008). These differences do not mean one brain is superior to the other; the research simply shows the brains are “just different” (Sax, p. 15).

Given that modern society has dictated there is little difference between boys and girls; educating them in the same classroom is acceptable practice. However, the stress placed upon boys during puberty is tremendous. Because boys have a fear of appearing less masculine in front of girls, they often manifest behaviors which can become self-destructive, both academically and personally. According to Gurian and Stevens (2006), many “cultures separate boys from girls just before and during puberty ... to accommodate the natural transformations boys and girls go through... in order to create gender-safe and gender-monitored environments” (2006 p.208). When the genders are

separated in school, the boys are allowed to live with their bodily changes in a non-threatening environment that is designed to maximize their strengths, thereby allowing them to achieve to their fullest potential.

According to Sax (2007) the gender gap has widened in regards to the amount of reading each gender engages in. A survey by the National Endowment for the Arts (NEA) showed that while girls' reading for pleasure has diminished, the amount boys read for pleasure has almost disappeared (Sax, p.3, 2007). Sax blames the lack of reading on the change in curriculum in kindergarten over the years from a socialization approach toward a more literacy based approach than was evident years ago.

Just as the proponents of single gender education for boys describe the benefits for them, so too do the proponents for girls in single gender education see benefits for the girls. Acknowledging the contributions of women is seen as one benefit for both genders which allows them to see the difference women have made in history (Schackelton-Verbuyst, 2009). According to the AAUW, girls receive less attention from teachers and more harassment from boys in a traditional coeducational setting (1992). Also included in the AAUW report is the contention that curriculum writers either "marginalize or ignore the contributions of girls and women" (1992). Examples given in the report include decreased support from the federal level for equity and a study revealing that only one of the ten most assigned reading books in schools was written by a woman (1992).

Over the past decades, the academic achievement expectations for students have increased steadily with the demand for higher accountability standards. The implementation of the No Child Left Behind legislation allows for public schools to use Innovative Programs Funds for single gender schools and classes (U.S. Department of

Education, 2002). Although the Title IX laws mandated an end to gender discrimination in public schools, in 2006 the U.S. Department of Education agreed to allow local education agencies the ability to provide single gender schools (Flowers, 2007). The state of South Carolina became the leader in revitalizing the concept of single gender education through the South Carolina State Department of Education Single Sex Education Office. The Office for Single Sex Education was able to provide resources and professional development to teachers and administrators (Bradley, 2007). During the economic downturn, the South Carolina Department of Education chose to eliminate the Office for Single Sex Education.

Although many educators seem to be in favor of single gender education, there is a school of thought that this may be the wrong approach toward improving the academic achievement of students. Many of the opponents of single gender education are those who see the initiative as a step backwards towards discrimination on the basis of sex, and ultimately race. Gandy of the National Organization of Women asserts the data does not prove boys are failing in school (2006). Gandy claims that boys are not performing worse academically than girls. Rather, girls are performing better in school and this upsets the balance of power.

With the implementation of NCLB, school districts and schools have been given the opportunity to explore different avenues in the education of their students. The concept of single gender schools and classes is an avenue many districts embrace as a solution to the lack of academic progress made by lower performing students. The South Carolina State Department of Education, under the direction of former Superintendent Jim Rex, became the national leader in implementation of single gender classes with the

goal of making single gender a choice for all of the state's children by the year 2012 (Adcox, 2007).

Research Questions

This study of single gender education was conducted to determine the impact of separating students based upon gender for instructional purposes. The research examined data from the computer-based test Measures of Academic Progress (MAP) to determine if boys and girls in single gender classrooms achieve higher scores than students in the traditional, co-educational, classrooms. Specifically, the study addressed the following research questions:

1. Is there a difference in Measurement of Academic Progress (MAP) math RIT scores for seventh grade females who are enrolled in single gender classes and seventh grade females who are enrolled in traditional coeducational classrooms?
2. Is there a difference in MAP math RIT scores for seventh grade males who are enrolled in single gender classes and seventh grade males who are enrolled in traditional coeducational classrooms?
3. Is there a difference in MAP reading RIT scores for seventh grade females who are enrolled in single gender classes and seventh grade females who are enrolled in traditional coeducational classrooms?
4. Is there a difference in MAP reading RIT scores for seventh grade males who are enrolled in single gender classes and seventh grade males who are enrolled in traditional coeducational classrooms?

Conceptual Framework

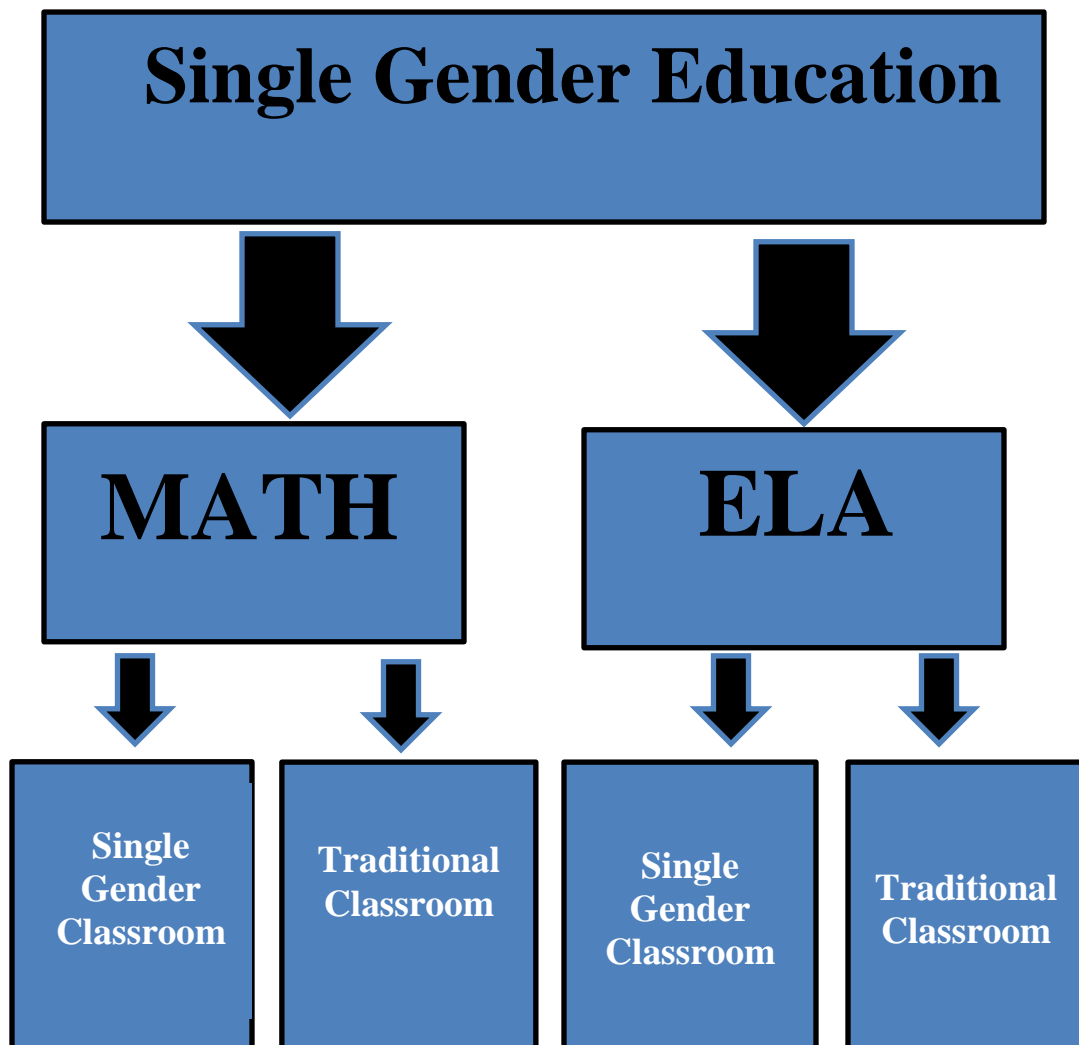


Figure 1.1: Conceptual Framework

Conceptual Framework

With the requirement to increase the scholastic achievement of all students provided for by NCLB, educators are searching to find methods and programs, based on research, which will allow them to reach each child. Thus, the conceptual framework for this study was based on the impact of single gender education in relation to increasing student achievement. The method of determining the effect single gender education has on scholastic achievement was the math and reading Measures of Academic Performance (MAP) computer-adaptive assessments developed by Northwestern Educational Alliance (NWEA) and administered to students.

In the study, the RIT scores of the MAP math and reading assessments for seventh grade students in two upstate South Carolina middle schools were examined to determine if a difference existed between the scores of students in single gender classes and students in traditional coeducational classes. The MAP assessments, computer generated, are administered in the fall and spring of each year to all students in third grade through ninth grade in the selected upstate South Carolina school district. At the conclusion of the test session in the fall, a RIT score is generated for each student in math and reading. In the spring, the student again takes the MAP assessment and a RIT score is generated. The two RIT scores are then compared to determine if the student scores increased, decreased, or remained the same.

This study analyzed the RIT scores for seventh grade students in the single gender classes based on spring mean RIT scores. The study also analyzed the spring mean RIT scores for seventh grade students in the traditional coeducational classes. The analysis of RIT scores was conducted for both math and reading. A comparison of the scores was

analyzed using independent sample t-tests to determine whether there was a difference between scores for students in the single gender classes and traditional coeducational classes.

Data Collection and Research Design

The single gender programs examined were established at two middle schools in an Upstate South Carolina school district. The upstate schools had single gender classes in seventh and/or eighth grades for three years and expanded the program into the sixth grade. The single gender programs at the middle schools were implemented in one team in each grade alongside a traditional coeducational program on the other teams in each of the grade levels. The students in the single gender classes were a heterogeneous group who were self-selected to participate in these classes. This study focused on the seventh grade students in the two schools because the seventh grade was the common grade level for the single gender programs at each of the schools. Teachers who taught in the single gender classes received professional development from school level administrators and the Coordinator of Single Gender Program at the South Carolina State Department of Education. In regard to school based professional development, administrators developed presentations and in-services aimed at arming teachers with the knowledge to instruct single gender classes. The Coordinator of Single Gender Program delivered professional development to teachers both around the state and in Columbia with the goal of providing them with specific strategies and information concerning the gender differences and preferences.

The research of single gender education at the two middle schools was a quantitative research study. Data were collected from the 2008-2009 school year. Students included in the study were the students enrolled in single gender classes and those from traditional coeducational classes. Student MAP scores were examined to find the difference in RIT scores for all students in the study. The RIT score is a unit of measurement derived from the Rasch model which is a scale of scores for practical measurement applications and is not easily mistaken for other common educational measurement scales (NWEA, 2011).

MAP scores of students enrolled in single gender classes were examined to determine if their scores were impacted during the seventh grade year. Students were given the MAP assessments in the fall and they received a score based on the RIT scale. Students and teachers were then given a projected spring goal of how many RIT points they should increase during the year. In the spring students again took the MAP assessments and their scores were compared with their fall RIT scores to determine if they achieved their goals.

Significance of the Study

To date, little research has been conducted on how academic achievement is affected by students educated in single gender classes. The question that must be raised is how much is the academic achievement of children in single gender classes impacted by being in separate single gender classrooms. This research study examined how student achievement was affected by enrollment in single gender programs.

Another significant element of this study is the need to explore educational options, such as single gender classrooms, to increase the level of student academic attainment. In schools today, there are boys and girls sitting in classes who are waiting until they are old enough to drop out of school because they are not engaged in their own education. When these students drop out of school, they continue the trend of crisis in this country. Many experts have conducted research into the so called “boy crisis” and have determined that because boys are disengaged, they are more likely to end up in special education, alternative schools and ultimately prison (Slocumb, 2004). However, Slocumb also provides evidence that the incidence of females in prison, addicted to drugs and alcohol, and participating in risky behavior, is also on the rise because culture has been telling them they have to act like the super heroines on TV (2004).

In a study of Hispanic females in California, Madigan provides three reasons for implementing single gender education (2003). Female students in the single gender classrooms reported greater comfort levels, fewer distractions, and less harassment from boys than their peers in the coeducational classrooms. The girls in single gender also had higher attendance rates and grade point averages.

Currently, the number of boys entering college and earning a degree is being surpassed by girls. The reason could rest with the fact that boys have been instructed without regard to their genders’ learning styles. If this study had demonstrated the effectiveness of single gender education in increasing academic achievement for both genders, then schools and districts could implement the program with more confidence in making a positive data driven decision concerning implementation of the program.

Another significant element of the study, particularly in South Carolina, rests in each schools and district's mandated improvement and absolute ratings on the state report card. Each fall every school and district receives a rating based on several factors ranging from student scores on Palmetto Assessment of State Standards (PASS) to student attendance. The requirement by the Education Accountability Act of 1998 is that every student, in every class, will improve their score on PASS to become proficient by the year 2014. If single gender classes can be shown to improve student achievement, then teachers and principals should be encouraged to implement the program as a means to improve their report card ratings.

Throughout South Carolina many schools were working to implement single gender education, in some form, as an option to assist in raising student achievement. The State Department of Education was helping to lead the way by establishing the Office of Single Sex Education to provide guidance to schools and districts during implementation of the program. In June 2006, the South Carolina Legislature passed into law Act 388, which was a tax swap program, aimed at eliminating the tax homeowners paid for school operations and replacing it with a penny increase of sales tax (Saltzman and Ulbrich, 2012). With the implementation of Act 388, school districts could no longer rely on the stable property tax and instead were told the sales tax increase would make up the difference. Unfortunately, the economy began to decline resulting in fewer revenue collections from the sales tax and ultimately having a negative impact on school and district operations budgets. According to Robert Davis, former Chief Financial Officer for Richland County School District Two, ACT 388 is "a horrible piece of legislation" and "has unbalanced the state budget and created nightmare scenarios for school

districts” (Click, p.3, 2013). As school budgets were impacted, and programs were affected, single gender education programs across the state began to experience losses in funding and personnel.

Parents and school officials already have anecdotal information about single gender classes, however, there is very little quantitative data concerning the impact of single gender classes on student achievement. A quantitative research approach in determining the effectiveness of single gender instruction was the appropriate methodology due to an increase in accountability prevalent in education today. Schools considering implementation of single gender classes will need to expend funds for the professional development of teachers. With the increase in spending and the potential impact on student achievement, schools need to have definitive data before launching single gender programs. While NCLB allows schools to implement innovative programs, such as single gender education, the requirement is that the programs be research based. The study undertaken aimed to provide additional research in the field of single gender education.

Assumptions

Many parents and educators see the anecdotal data concerning single gender education as proof, as opposed to conjecture, that it raises student achievement; however, little data currently shows the impact single gender classes have on academic achievement. This study was intended to determine the impact single gender education had on student achievement. In South Carolina, before the current budget crisis, single gender education was on the verge of becoming the new trend in education. To ensure

that single gender education is a valid program and not a trend, educators must have valid research data to show a positive effect on student achievement. If research can prove a positive impact on achievement, then educators can begin to implement the program with confidence and fidelity. If however, data shows a negative effect on achievement then educators may want to explore other approaches in their attempt to raise student achievement.

Definitions

For the purpose of this study, the following terms are defined as follows:

- Single Gender Education (Classroom) – separating students based on gender, either in by school or classroom, in order to provide instruction to one gender group of students without the presence of the other gender groups.
- Traditional Co-Education (Classroom) – the combination of both gender groups of students in the same classroom for the purpose of instruction.
- Measures of Academic Performance (MAP) – a “computerized adaptive assessment program that provides educators with the information they need to improve teaching and learning” (NWEA, 2004).
- RIT Score – a unit of measure of academic success based on the Raesch Unit of Measurement. RIT stems from the combination of Raesch Unit.

Delimitations

The research was conducted utilizing MAP student test results due to the availability of the data from the school district. A data bank, Enrich, was in place to store

student information derived from standardized assessments and teacher assigned grades. The central location of information assists district officials in analyzing data from multiple assessments or multiple years.

Also, the researcher chose to examine two middle schools that had implemented single gender classes. In order to analyze a significant number of records, the research determined the middle schools to be of sufficient population to provide a statistically significant sample size.

The decision to examine seventh grade data was due to the commonality of both schools implementing single gender classes in their seventh grade. In the district all grade level curriculum and standards are required to be followed by teachers when planning, implementing, and assessing their lessons. Thus, the researcher chose the seventh grade because both schools implemented single gender classes in this grade level. The lessons and assessments should be similar in nature in this grade.

Organization of the Study

The remainder of this study consists of four chapters. Chapter two is a review of literature concerning single gender education, gender differences, social aspects and student scholastic achievement. Chapter three describes the research design and methodology used in the study. The results of the data collected and findings are discussed in chapter four. Conclusions and recommendations are discussed in chapter five.

Summary

The state of South Carolina was on the cutting edge in single gender education. Across the state of South Carolina, there are many schools that have expressed an interest in adopting single gender classes. The research being conducted was important in determining if single gender instruction is the path these schools need to embark on, or whether the program is not pedagogically sound. By conducting a quantitative study of MAP testing data, the research may help guide district and state leaders in their decision to implement, or not, single gender education. Also, if the data show a positive effect on student achievement then the schools may continue to provide single gender instruction. Likewise, if the data show a negative effect on student achievement the faculty may choose to continue the more traditional coeducational classes.

Chapter Two

A Review of Literature

The review of literature and information concerning single gender classes finds references to the varied aspects of the subject. The current literature contains information from educators, researchers, theorists, physiologists, and others based in large part on anecdotal premises. Current empirical data concerning student scholastic achievement is mainly limited to research completed by doctoral students. The following review of the literature is divided into four main areas: the perspectives of the current movement toward single gender classes, including persuasive arguments both for and against the practice; a review of the literature on gender differences based on brain research; a review of the social aspects evidenced by the genders; and a review of the outcomes pertaining to students scholastic achievement.

Single Gender Perspective

Over the past several decades, the academic achievement expectations for students have increased steadily with the demand for higher accountability standards. The implementation of the No Child Left Behind legislation allows for public schools to use Innovative Programs Funds for single gender schools and classes (Paige, 2002). Even though the federal Title IX laws mandated an end to gender discrimination in public schools, in 2006 the U.S. Department of Education agreed to allow local education agencies the ability to provide single gender schools (Flowers, 2007). The concept of

single gender schools and classes is an avenue many districts embraced as a solution to the lack of academic progress made by lower performing students. The state of South Carolina became the leader in revitalizing the concept of single gender education through the South Carolina State Department of Education Single Sex Education Office. The office of Single Sex Education was able to provide resources and professional development to teachers and administrators (Bradley, 2007). During the economic downturn, the South Carolina Department of Education chose to eliminate the Office of Single Sex Education.

Even though many educators seem to be in favor of single gender education, there is a school of thought that this may be the wrong approach toward improving the academic achievement of students. Many of the opponents of single gender education are those who see the initiative as reverting back to discrimination on the basis of gender, and ultimately race. Gandy (2006) of the National Organization of Women asserts the data does not prove boys are failing in school. Gandy claims that boys are not doing worse than girls, rather, girls are doing better in school and this upsets the balance of power. Halpern asserts that students who enroll in single gender programs, for the most part, are advanced academically which may explain any perceived advantages of these programs (Halpern, Eliot, Bigler, Fabes, Hanish, Hyde, Liben, and Martin, 2011). The contention is that single gender programs segregate students and promote bias between the genders (Halpern, Eliot, Bigler, Fabes, Hanish, Hyde, Liben, and Martin, 2011). Others contend that the perceived advantages of single gender programs is directly related to the economic status of the students, the admissions criteria of the programs, and the resources available to the programs (Bigler and Eliot, 2001).

The AAUW (2008) states that single gender education has negative effects on the progress made by women and feel the new regulations allowing single gender education crosses a constitutional line regarding the civil rights of females.

The opponents vary from those strongly disagreeing with the concept as a whole, to those concerned that single gender classes may be sending the wrong message to boys and girls. The American Civil Liberties Union (ACLU) views single gender classes as unconstitutional and has begun a legal campaign to halt districts from providing students with separate classes.

Primarily, opponents of single gender classes contend there is no conclusive evidence to prove that separating the genders does anything to enhance student achievement. For example, the ACLU (2006) recently assisted a family in Alabama in their legal attempts to stop the single gender program at their daughter's middle school. The argument presented by the ACLU (2007) reasons the absence of life skills students learn by being around members of the opposite sex will have a lasting effect on both boys and girls in their adult lives and perpetuate gender stereotypes that Title IX has helped to extinguish. LaShawn Warren contends "women in America currently enjoy more opportunity than they ever have in the history of this nation... we should not weaken it without a truly compelling reason" (Warren, quoted in ACLU press release 2006). Bigler and Eliot write that separating the genders is much like separating the races in that the segregation may tend to reinforce stereotyping and attitudes regarding the intellectual abilities of males and females (2011).

Proponents of the boy crisis argue that female enrollment in higher education shows that boys are doing worse now than ever before (Slocumb, 2004). However,

feminists argue the boys' crisis is not a crisis but rather an awakening to the fact that females have caught up to their male counterparts. Because of salary inequities, a female with a college degree may make the same salary as a male with little or no college experience, thereby making the degree a necessity for competitive earnings (Gandy, 2006). The ACLU contends that the race to incorporate separate classes is being made in haste due to the fact that there has been little research completed showing a positive relationship between single gender classes and achievement (2006). Women's roles have changed over the past forty years with more and more women competing with men for higher paying jobs, thus promoting women to social equals of men. Many men contend this new equity is a problem (Gandy, 2006). Schools have historically been the training ground for adulthood and separating the sexes in schools leads students to believe that in the real world of work, men and women cannot work together thereby making equality an uneven field (Gandy, 2006).

Other opponents point to the language of the legislation providing for single gender classes as saying the separate classes should be comparable rather than equal. Too often, whether in single gender or coeducational classes, teachers have preconceived notions, or bias, toward boys and girls. This bias, if not exposed, lead to greater bias when the genders are separated (Sadker and Zittleman, 2005). According to some the gains seen in the single gender classes are attained by lower classroom sizes, engaged parents, and teachers trained in gender differences, but not to the separation of the genders (AAUW, Sadker and Zittleman). The differences also may be explained by the level of parental expectations and student perceptions of the single gender programs.

In looking at the literature we see how the passage and implementation of Title IX has affected the gains, academic and social, of females in the United States. Today, more girls are participating in higher level math and science classes and enrolling in higher education. Some authors have classified our current situation as a boy crisis while others say it is simply a matter of girls catching up and competing. We also have seen how the passage of NCLB has enabled the current rush to find better programs to meet the accountability requirements of the federal government. One of these programs, the creation of single gender classrooms, has caused a stir among educational theorists, practitioners, and feminist's organizations. The proponents of single gender classes have told us that boys and girls learn differently and separating them by gender will accentuate their academic progress by teaching to their gender strengths. Opponents of the single gender program point to the progress made by women since the passage of Title IX, and we should keep the status quo in order to further help women to meet the challenges of the world today. Opponents feel implementing single gender programs will have a harmful effect on future generations and point to the lack of data proving single gender classes provide any enhancement for either gender.

While girls do achieve higher scores in certain subjects, there are many areas where scholars see concern regarding the inequity toward females in schools. The inequity towards girls includes such factors as teacher bias. According to the AAUW, boys get more of the teacher's attention than girls in class due to several factors including the teachers desire to keep boys on task (1999). In their observations, Sadker and Sadker report that when it comes to classrooms, "teachers interact with males more frequently, ask them better questions, and give more precise and helpful feedback" (1994, p.1). In

addition, The United States Department of Education noted that girls are called on less frequently than boys and fewer are enrolled in advanced math and science classes (USDE, 2000). While some feminists contend single gender education has adverse effects for girls others say the programs provide “safe, unintimidating learning environments where girls can thrive and develop their confidence” (Thomas and Ungerleider, 2004, p. 14).

The academic performance of African-American students has historically been lower than that of white students, thus setting the stage for many forms of experiments attempted to raise academic performance and level the field for these students. A *CBS Nightly News* program (2009) highlighted the benefits of one such school, The Ginn Academy, a single gender boy’s high school targeting the most at-risk African-American high school students in Detroit, Michigan. According to the news report, the director has been able to transform the achievement of these students so that they have a higher than average graduation rate. The director attributes this achievement not only to single gender but also to the climate of the school.

Gender Differences

The theory behind single gender education will be reviewed, with gender differences in the classroom as a focal point. From our genetic makeup, research has discovered tremendous differences between males and females that dictate emotions, thoughts, and learning styles. A leading researcher on gender differences, Dr. Leonard Sax, describes in great detail many of the genetic traits found in males and females that begin to explain the gender specific characteristics of children. In *Why Gender Matters*

(2005), the differences between the male and female brains are explained by the examination of how the “functions (of the brain) are more compartmentalized in male brains and more globally distributed in female brains” (Sax, p.12). Another interesting difference discovered between the male and female brains is the research suggesting the brain tissue itself varies according to gender (Sax, 2005). Based on brain research, scientists have been able to examine the differences between the male brain and the female brain. Because males have the Y chromosome, scientists have found that “many areas of the male brain are rich in proteins that are coded directly by the Y chromosome” (Sax, p.14). Brain research shows that female brains do not possess the same types of protein due to the lack of the Y chromosome. Researchers have studied brain tissue and have been able to determine differences in the tissue samples, allowing them to differentiate tissue from male and female brains (DeFillipe, 2008). These differences do not mean one brain is superior to the other; the research simply shows the brains are “just different” (Sax, p. 15).

Research also demonstrated that vision differs according to gender. All human sight is programmed through use of ganglion cells that send signals from the eyes to the brains, helping to interpret images that are seen. According to Sax (2005), the ganglion cells are divided into “large magnocellular (M) and smaller parvocellular (P) cells” that perform different functions (p.19). In the human eyes, an image is received and travels through either the M cells or the P cells before proceeding to the brain to be interpreted. Scientists have “determined that the pathways from the retina to the brain are different in males and females” (Sax, p. 20). The M cells are responsible for communicating movement, while the P cells are responsible for communicating color variations (Sax,

2005). According to Sax, the male retina has more M cells which allow them to see movement better than females, while the female retina has more P cells allowing them to see more color variations (2005, p. 21). Vision allows females to more closely view facial details of the person they are seeing while male vision is not as attuned to these facial features allowing females to read facial expressions more accurately than males (Deak, 2008).

As humans grow, so do their brains. In the area of verbal skills, girls have an innate ability to communicate their emotions that boys find quite difficult due to brain development. According to research by Yerglun-Todd, female brain development allows the female to express emotions because the area responsible for this function is more developed than in the male brain (Sax, p. 29). Thus, asking boys to explain their emotions is an exercise in futility because their brains are not developed, or wired, to verbalize their emotions. As female brains develop, “the brain activity associated with emotions move from the amygdala to the cerebral cortex while in the male brain emotions remain in the amygdala” (Sax, p.30).

The genders differ due to hormonal influences which impact actions and emotions. In risk situations males secrete an increase in testosterone while females secrete an increase of oxytocin (Deak, 2008). The hormones testosterone and estrogen are introduced to the brain early in pregnancy and influence the formation of the brain resulting in increased language abilities for girls and limited language ability for boys (Deak, 2008). The testosterone prevalent in male brains is responsible for aggression and assertiveness making boy behavior seem more risky and disruptive (Deak, 2008).

Slocumb further explains that boys learn differently from girls because of language development. Because of girls' "facility with language allows them to process emotive data much more quickly than boys," girls communicate with their peers and teachers more effectively than boys (Slocumb, p. 17). In many classrooms, girls are rewarded because of their communication skills, whereas boys are often viewed differently because they have a difficult time with communication.

The genders differ in their autonomic functions present in their bodies. Divided into the sympathetic and parasympathetic systems, the autonomic nervous system controls the body's blood pressure, temperature, and homeostasis. The sympathetic system controls the human "fight or flight" responses of "accelerated heart rate, vasoconstriction, dilated pupils, etc., triggered by violence or confrontation" (Sax, 2006, p.191). The parasympathetic system "mediates digestion, and underlies the slower heart rate, vasodilation, and increased cutaneous blood flow that in turn affect the response to higher ambient temperatures" (Sax, 2006, p.191). According to Sax, the female is more affected by the parasympathetic nervous system while the male is more affected by the sympathetic nervous system (2006). Research indicates findings that males and females are affected differently by the room temperature due to the autonomic nervous system. Sax states that the ideal temperature is different for each gender with 69 degrees being ideal for males and 75 degrees being the ideal temperature for females.

Educators who are aware of the genetic differences between males and females conduct their classes in such a manner as to build on each gender's strengths. James discusses many strategies for addressing the educational needs of students. In classes where boys have difficulty focusing, teachers should attempt to move around the room to

hold the attention of boys, remembering the difference in M cells the boys have (James, p.33). The male hearing is different than that of females. The female ear contains more hair in the inner ear and increased vibrations of the bones of the inner ear than evidenced by boy ears (Deak, 2008). Because of this difference girls are able to hear better than boys. Boy's need to hear short, loud instructions, rather than lengthy instructions given in a soft or quiet voice (James, p.37). Female students often have difficulty with male teachers with loud voices because of this difference. Many times the female student will feel that the male teacher, who speaks loudly, is either angry or yelling (James, 2007).

Social Aspects

Why should educators be concerned about single gender education and about teaching to boys in particular? The answer may be found in the "boy code" which dictates to boys that they do not cry or show weakness in front of anyone (Slocumb, 2004). Boys are programmed by nurture, as well as nature, to keep their fears and emotions inside and away from others. When the "boy code" is in place, it can be very frustrating for educators and parents to contend with when they do not understand the code (Slocumb, 2004).

There is a need to examine why boys engage in some of their behaviors. Boys, because of brain development and societal expectations, engage in risky behavior, as well as competitive behavior. In the minds of many boys, masculinity is defined as "drinking beer, smoking pot, getting suspended from school, engaging in unprotected sex, and tricking someone into sex" (Slocumb, p.85). When boys are in classes and the teacher

places them in cooperative groups, little may be accomplished because “boys will spend most of their time trying to determine who will be the leader” (Slocumb, p.15).

Educators who are aware of male and female genetic differences are in a better position to conduct their classes in such a manner as to build on each gender’s strengths. James discusses several strategies for addressing the educational needs of students. In classes where boys have difficulty focusing, teachers should attempt to move around the room to hold the attention of boys, remembering the difference in M cells the boys have (James, p.33).

Given that modern society has dictated that there is little difference between boys and girls, then educating them in the same classroom is acceptable. However, the stress placed upon boys during puberty is tremendous. Because boys have a fear of appearing less masculine in front of girls, they often manifest behaviors which can become self-destructive, both academically and personally. According to Gurian and Stevens, many “cultures separate boys from girls just before and during puberty ... to accommodate the natural transformations boys and girls go through... in order to create gender-safe and gender-monitored environments” (2005, p.208). When the genders are separated in school, the boys are allowed to live with their bodily changes in a non-threatening environment that is designed to maximize their strengths, thereby allowing them to achieve to their fullest potential.

At the turn of the century, the focus by some theorists has begun to focus on the experiences of boys in school and what has been called the “boys crisis” (Slocumb, 2004). Most educators will agree that the majority of students in special education classes, experiencing truancy problems, and referred to the office for disciplinary reasons

are boys. What becomes of boys who show little or no interest in school is they are often subjected to severe actions by both the school systems and eventually the court system. Statistics compiled by the United States Department of Justice show that during the period from 1993 to 2001, males were more than twice as likely to commit a crime as their female counterparts. Young men between the ages of 13 – 18 committed more criminal offenses than any other five year age group (U.S. Department of Justice, 2003). The young men committing these offenses could be those same students sitting in classes without their gender specific education needs being met. Some writers have labeled the current state of male underachievement as a “boy’s crisis;” however, if the current situation of both genders during adolescence is examined, the result may be there is a crisis not only with boys, but that girls are facing crisis also (Slocumb, 2004, Tyre, 2005, Sax, 2005). During the same nine year period, 1993-2001, the number of females committing crimes also rose to alarming rates (U.S. Department of Justice, 2003).

In schools today, there are boys sitting in classes who are waiting until they are old enough to leave school because they are not engaged in their own education. Many experts have conducted research into the so called “boy crisis” and have determined that because boys are disengaged, they are more likely to end up in special education, alternative schools and ultimately prison (Slocumb, 2004). Boys are more likely than girls to experience disciplinary problems at school, experiment with drugs and alcohol, and suffer from depression and suicide (Slocumb, 2004).

Fordham and Ogbu (1985) identify three types of minorities in this country; autonomous, immigrant, and subordinate. Autonomous minorities are people belonging to a group numerically inferior to other groups; women, gay and lesbian, etc. Immigrant

minorities are those people who have moved to this country to improve their lives in areas like economic status, politics, and social status. The third group of minorities, those Fordham and Ogbu call subordinate minorities; are those people who historically were involuntarily and/or permanently incorporated into U.S. society through slavery or conquest: African-Americans, American Indians, and Mexican-Americans (Fordham and Ogbu, 1985).

Furthermore, there are three main areas that influence minority student academic success; academic self-confidence, academic ideology, and school behavior (Sanders, 1996). Students who have a high degree of academic self-confidence feel they can be successful in school and compete with other students to be the best in class; students who see school success as a means for future success, academic ideology, will do better in school; and students who have low incidence of misbehavior in school are better equipped to be successful since they are able to concentrate on their studies (Sanders, 1996). Parent and teacher support, along with church involvement, has been shown to have a significant impact on the grades and academic achievement of black students (Sanders, 1996).

An example of successful single gender experiences is demonstrated by the students at the Urban Prep Academy, a predominately black, all-male, public school in Chicago, Illinois. When the school opened in 2006 only 4 percent of its students were able to read on grade level (Novotney, 2011). In 2011 the school had “100 percent of its seniors accepted to four-year colleges or universities, many on full academic scholarships (p. 58). The school focuses on college and provides double periods of English as well as

single gender classes and specific teaching strategies aimed at the learning styles of male students (Novotney, 2011).

A study of Latina students in single gender classes found the advantages for these students were significant in the qualitative arena (Madigan, 2003). In the study the Latina girls reported greater comfort levels and fewer distractions whereas the girls in coeducational classes reported feeling tense and guarded. The girls in single gender classes also reported being less distracted and frustrated due to teasing from the boys. Possibly due to the greater comfort levels and fewer distractions, the Latina girls in single gender classes demonstrated higher attendance rates and grade point averages than Latina girls in coeducational classes (Madigan, 2003).

Student Scholastic Achievement

In today's data driven society, scholars are striving to determine the impact of single gender classes in relation to improving test scores and grades among school children. Educators are tasked with providing proof that concepts or practices work, or do not work, because of the tremendous amounts of money, time, and effort being expended, as well as the sense of urgency generated by the No Child Left Behind legislation. The concept of single gender education and the differences between the genders has been the subject of many studies in the United States, England, and Australia, as well as other countries around the world.

In examining the literature, several topics begin to take shape in relation to the study of single gender education. These key topics include the failure of boys (Slocumb, 2004; Sax, 2005; Rowe, 2000; Gurian and Henley, 2001; Salomone, 2003), the inequity

toward girls (AAUW, 1999; Sadker and Sadker, 1994), and the poor performance of minority students (Whittaker, 1991; Singh, Vaught, Mitchell 1998; Salomone, 2003).

According to Salomone (2003) the research has begun shifting toward the academic achievement of boys in the United States and Canada due to several factors. Whether the shift in performance of boys is caused by actual changes in interest levels, external factors such as video games, or the fact that girls are making tremendous academic strides is cause for debate (AAUW, 1999; Gurian and Stevens, 2003).

The virtues of single gender education, the reasons cited by some supporters, are based on anecdotal data and beliefs in the benefits of single gender classes. Proponents, such as Sax, believe that separating the genders and teaching them based on their genders' learning style will yield better results for these students' scholastic achievement. In traditional coeducational classes, students are taught together without regard to such factors room temperature, lighting, or color, whereas in a single gender class teachers are aware of and accommodate for these differences (Sax, 2005). At a time when academic expectations are on the rise and schools are attempting to improve student achievement, single gender classes may be the answer for boys, who generally, across demographic lines, are more likely to end up in special education classes and disengage from school (Tyre, quoted in Heitin, 2006). Sensing in the late twentieth century a critical absence of female students in higher math and science classes, educators began encouraging girls to undertake these classes. The United States Department of Education reports "there is empirical support for the view that single-sex schools may accrue positive outcomes, particularly for young women" (2000, p.18). While focusing on the situation with girls, practitioners and theorists ignored the overwhelming struggles experienced by boys in

reading and writing (Tyre, 2005). Due to changes in the educational climate, more boys in today's society are reporting they do not like school and they do not like to read (Sax, 2007). Likewise, Rowe and Rowe report that boys have fewer positive experiences in school due to lack of enjoyment, curriculum usefulness, and teacher bias (1999). Astute teachers may notice the different thinking and reasoning skills of students. In thinking about situations, the male tends to be a deductive thinker whereas the female leans toward inductive thinking (Gurian Henley, and Trueman, 2001).

Research conducted in Georgia middle schools to determine differences in academic achievement levels between single gender students and coeducational students showed the single gender students performed better than their coeducational counterparts. The researcher found statistically significant differences between the math and reading achievement levels of single gender students compared to coeducational students (Blake, 2012).

Research in Australia has shown the gap between the achievement of both boys and girls is growing both at the elementary and secondary levels (Rowe, 2000; ACER, 2002). When surveyed, boys responded that they had fewer positive experiences at school (Rowe and Rowe, 1999). A multi-year study by the Australian Council for Educational Research demonstrated that boys and girls in single gender schools scored 15 to 20 percentile ranks higher than boys and girls in coeducational schools (ACER, 2002).

A United Kingdom study comparing the difference in achievement of students concluded with several findings concerning the merits of single gender schools (Spielhofer, O'Donnell, Benton, Schagen, and Schagen, 2002). The study found girls in single gender schools performed better than girls in coeducational schools and boys in

single gender schools performed better than boys in coeducational schools (p.48). The study also concluded that boys who had previously shown poor, or low, achievement performed better in single gender schools than boys with similar performance in coeducational schools (p. 48). However, there was no difference in performance levels for male students with prior middle or high performance regardless of whether they were in single gender or coeducational schools (p. 48).

The National Assessment of Educational Progress (NAEP) is given to students in fourth grade and eighth grade. The 2002 NAEP showed a large gap in the reading test results at both grade levels with fourth grade girls scoring 7 percent higher than boys while in the eighth grade the girls outperformed the boys by 9 percent. The International Association for the Evaluation of Educational Achievement found that in thirty-five countries reading comprehension scores for girls were eighteen points higher than the scores for boys (IEA, 2003). Sax contends boys are reading less in the 2000's than they did in the 1970's based on five factors: changes in kindergarten from socializing classes to academic classes; the preponderance of video games; increased prescribing of ADHD medications; environmental endocrine disruptions; and a transformation of perception relating to masculinity (2007).

While the scores for girls have been shown to be greater in reading scores among girls than for boys, the same cannot be said for math scores. The Third International Mathematics and Science Survey showed that in subjects such as math and science, boys actually out performed girls (IEA, 1995). This test advanced the notion by some that there are certain male subjects (math and science) and female subjects (reading, language arts, fine arts) in which members of the opposite gender do not, generally, compete well

in or even enroll in (Sax, 2005; AAUW 1998; AAUW, 1992; Gurian and Henley, 2001; Rowe, 2000). Riordan (1990) and Salomone (2003) report that in single gender schools, boys are more likely to enroll in classes for the arts, music, drama, and foreign language than boys enrolled in coeducational schools.

In many schools across the country, minority students perform lower in classroom achievement and on standardized assessments. The question arises then whether or not these students have lower ability levels or whether there are other factors involved in their poor performance. Is the answer, as Fordham and Ogbu write “black students experience inordinate ambivalence and affective dissonance around the issue of academic excellence in the school context” (1985, p. 2)? Many in the black community feel that academic success is closely related to the white community’s domain, and to do well in school, in a sense, is to give up some of their heritage and become “more white”. In the black community, students can become discouraged by their peers from being successful because of the thought they might be emulating white people (Fordham and Ogbu, 1985).

Proponents of single gender programs argue that for some inner-city students, separating the sexes for instruction provides a better learning environment (Singh, Vaught, Mitchell, 1998). The researchers attempted to provide empirical data relating to the organization of classes and the level of achievement by students in four, fifth grade urban schools (Ibid). According to the study results, there was no significant difference in Iowa Test of Basic Skills (ITBS) reading scores between the single gender girls’ class scores and the coeducation girls scores (Singh, Vaught, Mitchell, 1998). When ITBS math scores were examined, the single gender girls’ scores were significantly higher than the scores for boys in either single gender or coeducational classes, but not significantly

higher than the coeducational girls (Singh, Vaught, Mitchell, 1998). However, for the science portion of the ITBS, the girls in single gender classes had the lowest scores of all groups while the coeducational classes scored higher overall than did the single gender classes (Singh, Vaught, Mitchell, 1998).

In the study of the four classes of at-risk students, Singh, Vaught, and Mitchell found surprising results as well as expected results. When examining boys scores on ITBS tests, the male students in coeducational classes scored higher in math, science, and social studies than did the boys in single gender classes (Singh, Vaught, Mitchell 1998). When the scores for girls was examined, the girls in single gender classes outperformed the girls in coeducational classes, thereby suggesting that single gender classes offer more advantages for girls than for boys (Singh, Vaught, Mitchell 1998).

In reviewing the achievement of male and female students in single gender classes compared to the achievement of students in coeducational classes, the gender of the teacher has been studied to examine the affect they had on their students. In classes taught by male teachers, the male students performed at a higher rate than the female students conversely the opposite holds true for girls taught by female teachers (Dee, 2006, Wagner, 2002).

Summary

The study of single gender education is divided into four aspects:

1. Single gender perspectives relating to proponents and opponents of the separation of students based on gender.
2. Gender differences between boys and girls regarding brain research.

3. The social aspects of single gender effects on boys and girls.
4. The scholastic achievement of single gender students compared to coeducational students.

The proponents of single gender classes argue that separating the sexes allows each to be taught in a manner meeting his or her gender related learning styles (Sax, 2005, James, 2007, Gurian, 2001, Slocumb, 2004, Tyre, 2005). The proponents argue that when the genders are in separate classrooms their needs are met and their ability to focus is greater than in a coeducational classroom. Likewise, opponents of single gender education argue implementing single gender education will have a harmful effect on future generations. Many of the opponents feel single gender education will promote bias and discrimination based gender leading to a decline in the advancements made by women since the inception of the federal Title IX laws (Bigler and Eliot, 2001, Gandy, 2006, Gerwertz, 2007, Halpern, Eliot, Bigler, Fabes, Hanish, Hyde, Liben, and Martin, 2011).

An examination of the brain reveals differences between male and female brain composition and development (DeFillipe, 2008, Sax, 2005). These differences affect each genders sight, communication skills, and expressive abilities. It is important to note the differences do not mean one brain is superior to the other, rather it means they are just different.

Social aspects of the genders are different in many cases due to brain development and societal expectations. The “boys will be boys” idea is due to what Slocumb describes as the “boy code” (2004). Boys tend to engage in behavior which may be deemed risky and competitive due to their perception of masculinity as defined by

their society. Because boys fear appearing less masculine to girls, they may participate in behaviors which can become self-destructive academically and personally. With the stress of puberty many cultures have historically separated boys and girls prior to, and during, this period of their lives (Gurian and Stevens, 2005). As Madigan demonstrated in her study of Latina girls, separating them from the boys allowed the girls to report greater comfort levels in the class without enduring the teasing of the boys (2003).

Scholastic achievement of students has always been important with a renewed emphasis being placed on the outcomes of all students since the renewal of the No Child Left Behind edition of the Elementary and Secondary Education Act (ESEA). Studies from around the world demonstrated the increase in achievement of students in single gender schools compared to those in coeducational schools (ACER, 2002, Rowe, 2000, Spielhofer, O'Donnell, Benton, Schagen, and Schagen, 2002). Several studies in the United States have also concluded an increased achievement for students in single gender classes compared to students in coeducational classes (Walter, 1997, Wagner, 2002, Davis, 2005, Horn, 2005, Thom 2006). Studies have also shown that the gender of the teacher has an impact on the achievement of the student specifically, girl's achievement is higher in classes taught by female teachers and boys' achievement is higher in classes taught by male teachers (Dee, 2006, Wagner, 2002).

Chapter Three

Research Methodology

The purpose of this study was to examine the impact of single gender education, specifically the separation of students into gender specific classrooms, on overall academic achievement in reading and mathematics.

In order to assist with the question of separating the genders in classrooms to improve academic achievement, several research questions were posed. The questions were aimed at guiding and focusing the research in a manner which assisted in making single gender education more clear.

1. Is there a difference in Measurement of Academic Progress (MAP) math RIT scores for seventh grade females who are enrolled in single gender classes and seventh grade females who are enrolled in traditional coeducational classrooms?
2. Is there a difference in MAP math RIT scores for seventh grade males who are enrolled in single gender classes and seventh grade males who are enrolled in traditional coeducational classrooms?
3. Is there a difference in MAP reading RIT scores for seventh grade females who are enrolled in single gender classes and seventh grade females who are enrolled in traditional coeducational classrooms?

4. Is there a difference in MAP reading RIT scores for seventh grade males who are enrolled in single gender classes and seventh grade males who are enrolled in traditional coeducational classrooms?

The remainder of this chapter is divided into four different sections. The first section describes the design of the study. The second section describes the population studied. Section three describes the research instrumentation used in the study. Finally, the fourth section focuses on the data collection process, the data analysis process, and the limitations of the study.

Research Design

The quantitative basis of this study was determined by the research questions and the sample of male and the sample of female students in two middle schools an Upstate South Carolina school district. The dependent variable being studied was the application of single gender education.

As stated in the research questions, the researcher sought to determine if the application of single gender education had a statistically, significant difference on the MAP math and reading mean RIT scores of male and female students when compared to the respective MAP math and reading mean RIT scores of male and female students in traditional coeducational classes.

The data were collected from samples at two middle schools that implemented both single gender education and traditional coeducational classes. Aggregate data from the (treatment) sample of students enrolled in single gender education classes from the two middle schools and then compared to aggregate data from the (control) sample of

students enrolled in coeducational classes from the two middle schools. The sample generated to answer research questions one and three reflects female students exposed to the treatment (i.e., single gender class) and female students within a controlled environment (i.e., traditional coeducational class). The second sample generated to answer research questions two and four reflects male students from the two middle schools. The sample comprised of male students includes both males exposed to the treatment and males within a control. Again, the treatment samples of male and female students were those students enrolled in the single gender education program. The control sample group included those students enrolled in the traditional, coeducational classes.

Since mean scores from the treatment groups were compared to mean scores from the control groups, the appropriate design was a test of mean differences (Gay, 1996). The *t*-Test for independent samples was the appropriate inferential, statistical test to employ. A single *t*-Test was conducted for each of the four research questions. In total, the study included four *t*-Tests - two comparing the female treatment group sample to the female control group sample, and two comparing the male treatment group sample to the male control group sample. Specifically, given research question one, the female treatment group's mean MAP math RIT scores was compared the female control group's mean MAP math RIT scores to determine if a statistically significant difference exists. Given research question two, the male treatment group's mean MAP reading scores was compared to the male control groups mean MAP reading scores to determine if a statistically significant difference exists. Given research question three, the female treatment group's mean MAP reading RIT scores were compared to the female control group's mean MAP reading RIT scores to determine if a statistically significant

difference exists. Given research question number four, the male treatment group's mean reading RIT scores were compared to the male control group's mean reading RIT scores to determine if a statistically significant difference exists.

Population and Sample

In order to implement the single gender program, a school must follow certain local district, state, and federal criteria. The school must offer a traditional coeducational option to students and parents who do not choose to participate in the single gender program. Students and parents must also voluntarily select to be in the single gender classroom program; the school may not arbitrarily schedule students into single gender classes.

The two middle schools are located in upstate South Carolina and include students in sixth, seventh, and eighth grades. The district encompassing the two schools is one of the largest in the state. Each of the schools is structured under the middle school concept with teams of students and teachers in each grade level. The schools are located in rural communities. School A has a population of 959 students and School B has a population of 859 students. The school demographics are 10% and 19% minority students for School A and School B respectively. The schools offer Carnegie Units for high school credit in the following courses; Algebra I, English I, Spanish I, Geometry, and French I. School B is an authorized International Baccalaureate Middle Years Program school. Each school includes a free and reduced meals program (FARMS) with the following percentages participating; School A is 39%, School B is 53%.

The sample involved in this study will be seventh grade students in two middle schools in an Upstate South Carolina school district. The students involved in the study are enrolled in either single gender programs or in traditional coeducational classroom settings. The students in the single gender classes, along with their parents, chose to participate in the program, whereas students in the traditional classes elected to remain in coeducational settings. The process of selection for single gender classes followed meetings with parents and students who then chose to participate in the program. In the course of these meetings information was shared concerning how classes would be structured and how instructional strategies would differ. Data taken from the students' scores on the MAP assessments reflect results from the spring administration of their seventh grade year.

The study will include all seventh grade students at the two middle schools. The office of research for the school district maintains a data-base, Enrich, with the MAP scores of all students in the district for the purpose of research. Because of the Enrich data-base, it is possible for the researcher to collect data from all members of the sample. By collecting the data on all students in the study population, the research had an adequate sample size.

Instrumentation

In order to answer the research questions, the researcher used Measures of Academic Progress (MAP) data from the students in the study. The MAP scores were identified as RIT scores, or Raesch Units. The RIT scores used were for students' math

and reading sub-tests. The data collected were stored in the district's collection of test data available to district and school level administrators, as well as teachers.

The RIT scores for the sub-tests reflected students' results based on the spring administration of the computer based assessment program. The MAP test is a "computerized adaptive assessment program that provides educators with the information they need to improve teaching and learning" (NWEA, 2008). The assessments are normed every three years and measure growth in student knowledge and abilities over time. For the purpose of this research the data collected were the RIT scores recorded for the selected students in the spring of their seventh grade year.

In order to answer questions one and two, the researcher examined the mean math RIT scores of the seventh grade students, both male and female, enrolled in single gender classes and coeducational classes. The research determined if spring RIT mean scores were statistically significant between female students receiving instruction in a single gender setting and those in traditional coeducational classes. Likewise, the research determined if spring RIT mean scores were statistically significant for male students enrolled in single gender classes and those enrolled in coeducational classes.

To answer questions three and four, the research examined the reading RIT mean scores of male and female students enrolled in single gender classes, compared to those enrolled in traditional coeducational classes. Specifically, the research determined if spring RIT mean scores were statistically significant for females enrolled in single gender classes compared to the scores of females enrolled in traditional coeducational classes. Likewise for question four, the research determined if spring RIT mean scores were

statistically significant for male students enrolled in single gender classes as opposed to those enrolled in traditional coeducational classes.

Reliability

The MAP assessments are computer based assessments given to students in the fall and spring of the school year. The intent is to gather informational data based on student understanding in the subjects tested. The MAP assessments' reliability is more involved than a test-retest normally measuring reliability due to the computer adaptive nature of the assessments. This is to say that each administration of the assessment is not the same test due to responses from the proceeding questions. NWEA states the reliability of the MAP assessment is a "mix between test-retest reliability and a type of parallel forms reliability, both of which are spread across several months – a much longer time frame than the typical two or three weeks" (NWEA, 2011, p 55). NWEA explains that while the two assessments, fall and spring, are not the same test, the construction and content of the assessments are the same which makes the reliability stronger.

In order to test the reliability of the MAP assessments, NWEA provides results of correlation for differing administrations of the reading and math assessments. For the assessments administered to the study groups, NWEA fall 2008 to spring 2009 Test-Retest correlations for South Carolina Aligned Common Item Pool Structures are as follows:

Reading - sixth grade 0.795, seventh grade 0.787, eighth grade 0.775
Mathematics – sixth grade 0.875, seventh grade 0.882, eighth grade 0.880 (NWEA, 2008).

As shown above there is a reliable correlation for the MAP reading and math assessments to the South Carolina curriculum content.

Validity

The MAP assessments are constructed to measure the student achievement growth across the spectrum of several months based on information found in stated learner outcome standards. The NWEA technical manual states “the better a test measures what it purports to measure and can support its intended uses and decision making, the stronger its validity is said to be” (NWEA, 2011, p.182).

According to NWEA, the MAP assessments are closely aligned with state accountability assessments in the area of content and standards. NWEA proposes that the MAP assessments results provide a close alignment with student results on the state assessments. In other words, the higher a students’ RIT score on the MAP assessments the higher their score should be on the state’s standards-based accountability assessments.

NWEA provides evidence of validity of concurrent performance on South Carolina accountability assessments for reading and mathematics in the form of Pearson Product-Moment Correlations. The coefficients of correlation are as follows:

Reading – sixth grade 0.783, seventh grade 0.774, eighth grade 0.763

Mathematics - sixth grade 0.849, seventh grade 0.839, eighth grade 0.833

(NWEA, 2008).

The evidence provided shows a strong correlation in reading between the content of the MAP test and the South Carolina state assessment. In mathematics the correlation is high between the MAP assessments and the South Carolina state assessment.

Data Collection Procedure and Analysis

The research conducted will be a quantitative study utilizing RIT scores on the Measures of Academic Progress (MAP) of seventh grade students from two different middle schools in an Upstate South Carolina school district. The data collected were the aggregate math and reading mean RIT scores of seventh grade students in these middle schools disaggregated by setting and gender. The scores were then used to determine if there is a statistically significant difference between the mean RIT scores of students involved in single gender classes and those in traditional coeducational classes. In addition to examining the aggregate scores of all students, the research examined the data for each school. The purpose of examining each schools data was to determine whether there existed unique differences between the two schools.

The data were collected from a database, Enrich, maintained by the Department of Research at the school district office. Included in this database are student test scores from all standardized assessments administered, as well as report card data for students. Data for students are maintained by teacher name, by grade level, and by course number. Anonymity was maintained by using only the scores from the sample of students. The data were collected and provided to the researcher by the district office staff to ensure confidentiality. No identifying factor was included for the data analysis or reporting of this data.

The researcher obtained written approval from the district superintendents' representative to collect the data. Parental consent was not needed because the data were already present and not identifiable. The MAP RIT data were collected from the database, Enrich, and then analyzed by use of the SPSS data analysis program. The data were disaggregated into four categories; single gender female reading and math mean RIT scores, traditional coeducational class female reading and math mean RIT scores, single gender male reading and math mean RIT scores, and traditional coeducational class male reading and math mean RIT scores. Gender was used to determine students' inclusion in either the single gender sample or the coeducational sample. Students were identified by coding each student based on their setting; 1 = females in treatment group sample, 0 = females in control group sample, 1 = males in treatment group sample, and 0 = males in control group sample. Analysis was conducted on the data to determine what, if any, difference exists among the specified groups.

Limitations

A limitation of this study was the emphasis placed on the taking of the MAP assessments by both the schools and the teachers. Given the amount of testing taking place in schools, students and teachers may place varying degrees of importance on the MAP assessments since they are primarily used to assist teachers in diagnosing students' instructional strengths and weaknesses.

Another limitation to the study is the amount of knowledge and professional development teachers may have in classroom instructional practices. As stated earlier, teachers in the single gender classes received professional development in how to

specifically teach to the strengths of the individual genders. Teachers in the traditional classes may not have received any specialized training other than what they received in college.

Related to the prior limitation is the quality and fidelity teachers implement the specific strategies they have been taught in their professional development and in-services related to single gender education.

A limitation of using the MAP scores results from the computer adaptive nature of the assessments. The possibility exist that no two students receive the exact same questions on the assessments due to the adaptive nature of the assessments.

Also considered a limitation is built-in bias of the voluntary participation in the single gender program. Previous research demonstrates the possibility exists that students participating in single gender programs have parents who place greater emphasis on education in general and who are more involved in their children's educational activities. Research also points to these parents as possessing the means to provide greater resources and experiences for their children.

This study was conducted using results from two middle schools in an Upstate South Carolina school district. The limitation here is that in order to be able to more generalize the findings of the research, a larger sample size involving more students from the southeast United States may produce more generalizable results.

Summary

In designing the research methods for this study, the researcher used data available through a data base maintained by the Research Office of the local school

district. The data is a result of reading and mathematics MAP assessments given to students in the fall and spring of the academic year. Certain demographic data is available to the researcher; however, only gender information will be used to identify students and their RIT scores. Chapter four will present the analysis of data and the differences, or not, between the data for students in single gender classes and students in coeducational classes. Chapter five will summarize the results of the study, make conclusions, discuss implications of the study, and make recommendations for future studies.

Chapter Four

Data Analysis

This study examined the impact single gender education had on student test scores in math and reading compared to the test results of students in traditional coeducational classes. Specifically, the research intent was to determine if there was a positive or negative effect on test scores for students enrolled in single gender classes. The data collected represented the spring, math and reading scores of seventh grade students on the Measures of Academic Progress (MAP) assessments during the 2008-2009 school year. The MAP assessments, computer based diagnostic assessments, were administered in the fall of 2008 and spring of 2009. The scores for all students were aggregated into four groups; females in single gender classes, females in coeducational classes, males in single gender classes, and males in coeducational classes. The mean differences between each gender's scores were analyzed for students as a whole population and also within each school. This chapter presents an analysis of the data collected from the assessment results of all seventh grade students in the two selected middle schools.

Research Questions

The overall theme of the research was to investigate the effect single gender education had on the scholastic achievement of students. Four research questions were developed to guide the research for this study:

1. Is there a difference in Measurement of Academic Progress (MAP) math RIT scores for seventh grade females who are enrolled in single gender classes and seventh grade females who are enrolled in traditional coeducational classrooms?
2. Is there a difference in MAP math RIT scores for seventh grade males who are enrolled in single gender classes and seventh grade males who are enrolled in traditional coeducational classrooms?
3. Is there a difference in MAP reading RIT scores for seventh grade females who are enrolled in single gender classes and seventh grade females who are enrolled in traditional coeducational classrooms?
4. Is there a difference in MAP reading RIT scores for seventh grade males who are enrolled in single gender classes and seventh grade males who are enrolled in traditional coeducational classrooms?

Description of Population

An analysis of schools implementing single gender classes determined that there were three schools in an upstate school district offering single gender education and that seventh grade was the common grade denominator between the schools. Assessment results for seventh grade students in two upstate middle schools were used in examining the effect single gender education might have on student achievement. Due to technological issues experienced by the school district, data from a third school eligible for study was deleted and no longer available. As a result, two schools' test data were collected and analyzed to determine impact as measured by examining the mean RIT

score differences between the female groups, single gender and coeducational, and the male groups, single gender and coeducational.

The two middle schools are located in Upstate South Carolina and include students in sixth, seventh, and eighth grades. The school district where the two schools are located is one of the largest in the state. Each of the schools is structured under the traditional middle school concept with teams of students and teachers in each grade level. The schools are located in rural communities with strong parental support for the academic programs. School A has a population of 959 students and School B has a population of 859 students. The school demographics are 10% minority for School A and 19% minority for School B. Both schools offer Carnegie Units for high school credit in the following courses; Algebra I, English I, Spanish I. One of the schools is an authorized International Baccalaureate Middle Years Program school. Each school includes a free and reduced meals program (FARMS) with the following percentages participating; School A is 39% and School B is 53%.

The population included in this study included seventh grade students in two middle schools in an Upstate South Carolina school district. The students were enrolled in either single gender programs or in traditional coeducational classroom settings. The students in the single gender classes, along with their parents, chose to participate in the program. The process of selection for single gender classes included meetings with parents and students who then chose to participate in the program. In the course of these meetings, information was shared concerning how the program would be structured and how instructional strategies would be research-based and gender specific. Data taken

from the students' scores on the MAP assessments reflect results from the spring administration in their seventh grade year.

The study includes all seventh grade students at the two middle schools. The Office of Research for the school district maintains a data base with the MAP scores of all students in the district for the purpose of research. Because of the Enrich data base, it is possible for the researcher to collect data for all members of the population. By collecting the data on all students in the study population, the research was able to have an adequate sample size.

Instrumentation

In order to answer the research questions, the researcher used Measures of Academic Progress (MAP) data for the students in the study. The MAP scores are identified as RIT scores, or Raesch Units. The RIT scores are for students' math and reading sub-tests. The data collected are stored in the district's collection of test data available to district, school level administrators, and teachers.

The RIT scores for the sub-tests reflect students' results based on the spring administration of the computer based assessment program. The MAP test is a "computerized adaptive assessment program that provides educators with the information they need to improve teaching and learning" (NWEA, 2008). The assessments are normed every three years and measure growth in student knowledge and abilities over time. For the purpose of this research, the data collected was the RIT scores recorded for the selected students in the spring of their seventh grade year.

In order to answer questions one and two, the researcher examined the mean math RIT scores of the seventh grade students, both male and female, enrolled in single gender classes and coeducational classes. The research determined if the mean math RIT spring scores were statistically significant between female students receiving instruction in a single gender setting compared to those in traditional coeducational classes. Likewise, the research determined if the mean math RIT spring scores were statistically significant for male students enrolled in single gender classes compared to the mean math RIT scores of male students enrolled in coeducational classes.

To answer questions three and four, the research examined the mean reading RIT scores of female and male students enrolled in single gender classes, compared to those enrolled in traditional coeducational classes. Specifically, the research determined if the mean reading RIT spring scores were statistically significant for females enrolled in single gender classes compared to the mean reading RIT scores of females enrolled in traditional coeducational classes. Likewise for question four, the research determined if the mean reading RIT spring scores were statistically significant for male students enrolled in single gender classes compared to the mean reading RIT scores of male students enrolled in traditional coeducational classes.

Descriptive Data

Descriptive statistics were conducted for the population of students' mean scores examined for the research. The statistics are based on the spring MAP math and reading mean scores for seventh grade female and male students enrolled in single gender classes and in coeducational classes. Statistics conducted involved the aggregate population of

females and males from both schools and also on the disaggregated population of females and males from each individual school. This information is presented in Tables 4.1 through 4.12. The total population of student scores involved 559 students, 275 female students and 264 male students.

The data results found in Table 4.1 indicates there were more female students (154) enrolled in coeducational classes than female students (121) enrolled in single gender classes. The data also shows the aggregate single gender female students' mean math MAP (232.00) scores were slightly higher than the mean math MAP (230.56) scores of female students in coeducational classes.

Table 4.1 Measures of Central Tendency - Aggregate Female Math MAP Scores

GROUP	n	Mean	Median	Mode
Single Gender	121	232.00	236.00	237
Co-education	154	230.56	233.00	237

The data results found in Table 4.2 indicates there were more seventh grade female students (93) in School A enrolled in coeducational classes than female students (50) enrolled in single gender classes. The data also indicates the female single gender students mean math MAP (232.22) scores were slightly higher than the mean math MAP (231.42) scores for the female students in coeducational classes.

Table 4.2 Measures of Central Tendency - School A Female Math MAP Scores

GROUP	n	Mean	Median	Mode
Single Gender	50	232.22	233.00	238
Co-education	93	231.42	233.00	239

The data results in Table 4.3 indicates there were more seventh grade female students (71) in School B enrolled in single gender classes than female students (61) enrolled in coeducational classes. The data indicates that in School B the female single gender students mean math MAP (231.85) scores were higher than the mean math MAP (229.25) scores of the females in coeducational classes.

Table 4.3 Measures of Central Tendency - School B Female Math MAP Scores

GROUP	n	Mean	Median	Mode
Single Gender	71	231.85	237.00	237
Co-education	61	229.25	232.00	237

The data results found in Table 4.4 indicates more seventh grade male students (137) were enrolled in coeducational classes than male students (127) enrolled in single gender classes. The data also indicates the aggregate mean math MAP (232.12) score for seventh grade male students in coeducational classes was slightly higher than the mean math MAP (231.91) score for seventh grade male students enrolled in single gender classes.

Table 4.4 Measures of Central Tendency - Aggregate Male Math MAP Scores

GROUP	n	Mean	Median	Mode
Single Gender	127	231.91	233.00	231
Co-education	137	232.12	233.00	239

The data results found in Table 4.5 indicates that in School A more seventh grade male students (87) were enrolled in coeducational classes than male students (55) enrolled in single gender classes. The data also indicates the mean math MAP (234.04) score for male students enrolled in single gender classes was higher than the mean math MAP (230.37) score of male students enrolled in coeducational classes.

Table 4.5 Measures of Central Tendency - School A Male Math MAP Scores

GROUP	n	Mean	Median	Mode
Single Gender	55	234.04	236.00	235
Co-education	87	230.37	233.00	239

The data results found in Table 4.6 indicates more seventh grade male students (72) in School B enrolled in single gender compare to the male students (50) enrolled in coeducational classes. The data indicates the seventh grade male students in coeducational classes had higher mean math MAP (235.16) scores than the mean math MAP (230.29) scores of the male students enrolled in single gender classes.

Table 4.6 Measures of Central Tendency - School B Male Math MAP Scores

GROUP	n	Mean	Median	Mode
Single Gender	72	230.29	231.00	231
Co-education	50	235.16	234.50	244

The data found in Table 4.7 indicates more seventh grade female students (154) were enrolled in coeducational classes than female students (121) enrolled in single

gender classes. The data also shows the seventh grade female students enrolled in single gender classes had a higher mean reading MAP (221.38) score than the mean reading MAP (219.05) score of seventh grade female students in coeducational classes.

Table 4.7 Measures of Central Tendency - Aggregate Female Reading MAP Scores

GROUP	n	Mean	Median	Mode
Single Gender	121	221.38	222.00	233
Co-education	154	219.05	219.00	222

The data found in Table 4.8 indicates there were more seventh grade female students (93) in School A enrolled in coeducational classes than female students (50) enrolled in single gender classes. Additionally, the data indicates the female students in single gender classes had a higher mean reading MAP (222.74) score than the mean reading MAP (220.10) score of female students enrolled in coeducational classes.

Table 4.8 Measures of Central Tendency - School A Female Reading MAP Scores

GROUP	n	Mean	Median	Mode
Single Gender	50	222.74	223.00	233
Co-education	93	220.10	221.00	225

The data found in Table 4.9 indicates there were more seventh grade female students (71) enrolled in single gender classes compared to female students (61) enrolled in coeducational classes at School B. The data also indicates the female students enrolled

in single gender classes had a higher mean reading MAP (220.42) scores than the mean reading MAP (217.44) score of females enrolled in coeducational classes.

Table 4.9 Measures of Central Tendency - School B Female Reading MAP Scores

GROUP	n	Mean	Median	Mode
Single Gender	71	220.42	221.00	230
Co-education	61	217.44	218.00	222

The data found in Table 4.10 indicates there were more male students (137) enrolled in coeducational classes compared to the number of male students (127) enrolled in single gender classes. The data indicates the male students enrolled in single gender classes had a mean reading MAP (218.20) scores only slightly higher than the mean reading MAP (218.01) score of male students enrolled in coeducational classes.

Table 4.10 Measures of Central Tendency - Aggregate Male Reading MAP Scores

GROUP	n	Mean	Median	Mode
Single Gender	127	218.20	219.00	211
Co-education	137	218.01	219.00	219

The data found in Table 4.11 indicates that in School A there were more male students (87) enrolled in coeducational classes than the male students (55) enrolled in single gender classes. The data also indicates the male students enrolled in single gender classes at School A had a higher mean reading MAP (220.09) score than the mean reading MAP (217.31) of male students enrolled in coeducational classes.

Table 4.11 Measures of Central Tendency - School A Male Reading MAP Scores

GROUP	n	Mean	Median	Mode
Single Gender	55	220.09	222.00	223
Co-education	87	217.31	219.00	219

The data in found in Table 4.12 indicates there were more male students (72) enrolled in single gender classes at School B than the number of male students (50) enrolled in coeducational classes. The data indicates that the male students in coeducational classes had a higher mean reading MAP (219.22) score when compared to the mean reading MAP (216.76) score of male students enrolled in single gender classes.

Table 4.12 Measures of Central Tendency - School B Male Reading MAP Scores

GROUP	n	Mean	Median	Mode
Single Gender	72	216.76	217.00	211
Co-education	50	219.22	220.50	225

Statistical Analysis of Research Questions

The primary purpose of this study was to examine the effect of single gender education on the overall academic achievement of students in reading and mathematics. The following questions were posed and the results follow.

Research Question One

Is there a difference in Measurement of Academic Progress (MAP) math RIT scores for seventh grade females who are enrolled in single gender classes and seventh grade females who are enrolled in traditional coeducational classrooms?

Aggregate:

An independent samples t-test was conducted to answer question one. The Levene's test for Equality of Variances was conducted to evaluate the assumption of whether the population variances for the two groups are equal. The Levene's test was not statistically significant ($p > .05$). Referencing the t test for equal variance, as shown in Table 4.13, the independent samples t-test was not statistically significant, $t(273) = -.839$, $p = .402$. Seventh grade female students instructed in single gender classrooms ($M = 232.00$, $SD = 14.37$) performed similarly on the MAP math test when compared to seventh grade female students instructed in coeducational classrooms ($M = 230.56$, $SD = 13.95$).

Table 4.13 Levene's Test - Aggregate Female Math MAP RIT

Group	$t(273) = -.839$	
Single Gender	$M = 232.00$	$SD = 14.37$
Co-education	$M = 230.56$	$SD = 13.95$
	$p = .402$	$p > .05$

School A:

An independent-samples t-test was conducted to answer question one. The Levene's test for Equality of Variances was conducted to evaluate the assumption of whether the population variances for the two groups are equal. The Levene's test was not

statistically significant ($p > .05$). Referencing the t-test for equal variance, as shown in Table 4.14, the independent samples t-test was not statistically significant, $t(141) = -.322$, $p = .748$. Seventh grade female students instructed in single gender classrooms ($M = 232.22$, $SD = 12.38$) performed similarly on the MAP math test when compared to seventh grade female students instructed in coeducational classrooms ($M = 231.42$, $SD = 15.03$).

Table 4.14 Levene's Test - School A Female Math MAP RIT

Group	$t(141) = -.322$	
Single Gender	$M = 232.22$	$SD = 12.38$
Co-education	$M = 231.42$	$SD = 15.03$
	$p = .748$	$p > .05$

School B:

An independent samples t-test was conducted to answer question one. The Levene's test for Equality of Variances was conducted to evaluate the assumption of whether the population variances for the two groups are equal. The Levene's test was not statistically significant ($p > .05$). Referencing the t-test for equal variance, as shown in Table 4.15, the independent samples t-test was not statistically significant, $t(130) = -1.051$, $p = .295$. Seventh grade female students instructed in single gender classrooms ($M = 231.85$, $SD = 15.70$) performed similarly on the MAP math test when compared to seventh grade female students instructed in coeducational classrooms ($M = 229.25$, $SD = 12.14$).

Table 4.15 Levene's Test - School B Female Math MAP RIT

GROUP	t (130) = -1.051	
Single Gender	M = 231.85	SD = 15.70
Co-education	M = 229.25	SD = 12.14
	p = .295	p > .05

Research Question Two

Is there a difference in MAP math RIT scores for seventh grade males who are enrolled in single gender classes and seventh grade males who are enrolled in traditional coeducational classrooms?

Aggregate:

An independent samples t-test was conducted to answer question two. The Levene's test for Equality of Variances was conducted to evaluate the assumption of whether the population variances for the two groups are equal. The Levene's test was not statistically significant ($p > .05$). Referencing the t-test for equal variance, as shown in Table 4.16, the independent samples t-test was not statistically significant, $t(262) = .104$, $p = .917$. Seventh grade male students instructed in single gender classrooms ($M = 231.91$, $SD = 16.04$) performed similarly on the MAP math test to seventh grade male students instructed in coeducational classrooms ($M = 232.12$, $SD = 15.63$).

Table 4.16 Levene's Test - Aggregate Male Math MAP RIT

GROUP	t (262) = .104	
SG Male	M = 231.91	SD = 16.04
CE Male	M = 232.12	SD = 15.63
	p = .917	p > .05

School A:

An independent-samples t-test was conducted to answer question two. The Levene's test for Equality of Variances was conducted to evaluate the assumption of whether the population variances for the two groups are equal. The Levene's test was not statistically significant ($p > .05$). Referencing the t-test for equal variance, as shown in Table 4.17, the independent samples t-test was not statistically significant, $t(140) = -1.40$, $p = .164$. Seventh grade male students instructed in single gender classrooms ($M = 234.04$, $SD = 13.10$) performed similarly on the MAP math test to seventh grade male students instructed in coeducational classrooms ($M = 230.37$, $SD = 16.42$).

Table 4.17 Levene's Test - School A Male Math MAP RIT

GROUP	$t(141) = -1.40$	
Single Gender	$M = 234.04$	$SD = 13.10$
Co-education	$M = 230.37$	$SD = 16.42$
	$p = .164$	$p > .05$

School B:

An independent samples t-test was conducted to answer question two. The Levene's test for Equality of Variances was conducted to evaluate the assumption of whether the population variances for the two groups are equal. The Levene's test was not statistically significant ($p > .05$). Referencing the t-test for equal variance, as shown in Table 4.18, the independent samples t-test was not statistically significant, $t(120) = 1.619$, $p = .108$. Seventh grade male students instructed in single gender classrooms ($M =$

230.29, SD = 17.89) performed similarly on the MAP math test to seventh grade male students instructed in coeducational classrooms (M = 235.16, SD = 13.79).

Table 4.18 Levene's Test - School B Male Math MAP RIT

GROUP	t (120) = 1.619	
Single Gender	M = 230.29	SD = 17.89
Co-education	M = 235.16	SD = 13.79
	p = .108	p > .05

Research Question Three

Is there a difference in MAP reading RIT scores for seventh grade females who are enrolled in single gender classes and seventh grade females who are enrolled in traditional coeducational classrooms?

Aggregate:

An independent samples t-test was conducted to answer this question. The Levene's test for Equality of Variances was conducted to evaluate the assumption of whether the population variances for the two groups are equal. The Levene's test was not statistically significant ($p > .05$). Referencing the t-test for equal variance, as shown in Table 4.19, the independent samples t-test was not statistically significant, $t(273) = -1.663$, $p = .097$. Seventh grade female students instructed in single gender classrooms (M = 221.38, SD = 11.292) performed similarly on the MAP reading test to seventh grade female students instructed in coeducational classrooms (M = 219.05, SD = 11.75).

Table 4.19 Levene's Tests - Aggregate Female Reading MAP RIT

GROUP	t (273) = -1.663	
Single Gender	M = 221.38	SD = 11.292
Co-education	M = 219.05	SD = 11.175
	p = .097	p > .05

School A:

An independent samples t-test was conducted to answer this question. The Levene's test for Equality of Variances was conducted to evaluate the assumption of whether the population variances for the two groups are equal. The Levene's test was not statistically significant ($p > .05$). Referencing the t-test for equal variance, as shown in Table 4.20, the independent samples t-test was not statistically significant, $t(141) = -1.28$, $p = .203$. Seventh grade female students instructed in single gender classrooms ($M = 222.74$, $SD = 10.31$) performed similarly on the MAP reading test to seventh grade female students instructed in coeducational classrooms ($M = 220.10$, $SD = 12.49$).

Table 4.20 Levene's Test - School A Female Reading MAP RIT

GROUP	t (141) = -1.28	
Single Gender	M = 222.74	SD = 10.31
Co-education	M = 222.10	SD = 12.49
	p = .203	p > .05

School B:

An independent samples t-test was conducted to answer this question. The Levene's test for Equality of Variances was conducted to evaluate the assumption of

whether the population variances for the two groups are equal. The Levene's test was not statistically significant ($p > .05$). Referencing the t-test for equal variance, as shown in Table 4.21, the independent samples t-test was not statistically significant, $t(130) = -1.517$, $p = .132$. Seventh grade female students instructed in single gender classrooms ($M = 220.42$, $SD = 11.92$) performed similarly on the MAP reading test to seventh grade female students instructed in coeducational classrooms ($M = 217.44$, $SD = 10.44$).

Table 4.21 Levene's Test - School B Female Reading MAP RIT

GROUP	$t(130) = -1.517$	
Single Gender	$M = 220.42$	$SD = 11.92$
Co-education	$M = 217.44$	$SD = 10.49$
	$p = .132$	$p > .50$

Research Question Four

Is there a difference in MAP reading RIT scores for seventh grade males who are enrolled in single gender classes and seventh grade males who are enrolled in traditional coeducational classrooms?

Aggregate:

An independent samples t-test was conducted to answer this question. The Levene's test for Equality of Variances was conducted to evaluate the assumption of whether the population variances for the two groups are equal. The Levene's test was not statistically significant ($p > .05$). Referencing the t-test for equal variance, as shown in Table 4.22, the independent samples t-test was not statistically significant, $t(262) = -.123$, $p = .902$. Seventh grade male students instructed in single gender classrooms ($M =$

218.20, SD = 13.10) performed similarly on the MAP reading test to seventh grade male students instructed in coeducational classrooms (M = 218.01, SD = 12.94).

Table 4.22 Levene's Test - Aggregate Male Reading MAP RIT

GROUP	t (262) = -.123	
Single Gender	M = 218.20	SD = 13.10
Co-education	M = 218.01	SD = 12.94
	p = .902	p > .05

School A:

An independent samples t-test was conducted to answer this question. The Levene's test for Equality of Variances was conducted to evaluate the assumption of whether the population variances for the two groups are equal. The Levene's test was not statistically significant ($p > .05$). Referencing the t-test for equal variance, as shown in Table 4.23, the independent samples t-test was not statistically significant, $t(140) = -1.15$, $p = .252$. Seventh grade male students instructed in single gender classrooms (M = 220.09, SD = 14.11) performed similarly on the MAP reading test to seventh grade male students instructed in coeducational classrooms (M = 217.31, SD = 14.00).

Table 4.23 Levene's Test - School A Male Reading MAP RIT

GROUP	t (140) = -1.15	
Single Gender	M = 220.09	SD = 14.11
Co-education	M = 217.31	SD = 14.00
	p = .252	p > .05

School B:

An independent samples t-test was conducted to answer this question. The Levene's test for Equality of Variances was conducted to evaluate the assumption of whether the population variances for the two groups are equal. The Levene's test was not statistically significant ($p > .05$). Referencing the t-test for equal variance, shown in Table 4.24, the independent samples t-test was not statistically significant, $t(120) = 1.143$, $p = .255$. Seventh grade male students instructed in single gender classrooms ($M = 216.76$, $SD = 12.18$) performed similarly on the MAP reading test to seventh grade male students instructed in coeducational classrooms ($M = 219.22$, $SD = 10.89$).

Table 4.24 Levene's Test - School B Male Reading MAP RIT

GROUP	$t(120) = 1.143$	
Single Gender	$M = 216.76$	$SD = 12.18$
Co-education	$M = 219.22$	$SD = 10.89$
	$p = .255$	$p > .05$

Summary

The findings in this chapter present an analysis of the MAP assessment RIT score data for seventh grade students at two Upstate South Carolina middle schools implementing single gender programs. Specifically, the study examined the mean differences between female students enrolled in single gender classes and female students enrolled in coeducational classes in the areas of reading and math MAP scores. Additionally, the study examined the mean differences between the reading and math

MAP scores for male students enrolled in single gender classes and male students enrolled in coeducational classes.

Chapter Five contains a summary of the research findings, interpretations and discussion of the findings, researcher conclusions, and recommendations for further research.

Chapter Five

Summary, Conclusions, and Recommendations

This chapter presents a summary of the research completed on the implementation of single gender classes in two middle schools in Upstate South Carolina and the conclusions drawn from the quantitative data presented in chapter four. Also included in this chapter are implications for schools and districts contemplating the implementation of single gender classes and suggestions for further research in the area of single gender education.

Summary of Study

The purpose of this study was to examine the effect of single gender education on the academic achievement of both male and female students in the areas of math and reading. Many differences exist between the genders leading to questions concerning how to utilize and acknowledge these differences to the best advantage. The study of the literature revealed four areas of relevance to the study; single gender perspectives, gender differences, social aspects, and scholastic achievement.

Four research questions were developed to guide and give purpose to the study.

1. Is there a difference in Measurement of Academic Progress (MAP) math RIT scores for seventh grade females who are enrolled in single gender classes and seventh grade females who are enrolled in traditional coeducational classrooms?

2. Is there a difference in MAP math RIT scores for seventh grade males who are enrolled in single gender classes and seventh grade males who are enrolled in traditional coeducational classrooms?
3. Is there a difference in MAP reading RIT scores for seventh grade females who are enrolled in single gender classes and seventh grade females who are enrolled in traditional coeducational classrooms?
4. Is there a difference in MAP reading RIT scores for seventh grade males who are enrolled in single gender classes and seventh grade males who are enrolled in traditional coeducational classrooms?

In order to answer the research questions, the researcher used Measures of Academic Progress (MAP) data for the students in the study. The MAP scores are identified as RIT scores, or Raesch Units, which reflect results of students' math and reading sub-tests. The researcher examined the MAP reading and math data for all seventh grade students in two middle schools in an Upstate South Carolina school district. The schools were chosen based on the implementation of a single gender program as well as a traditional coeducational program. Seventh grade scores were chosen to be examined because it was the common grade level for both schools in which the single gender program was implemented.

As the anonymity of the students involved in the study was of utmost importance, permission to use the test data was granted by the school district superintendent's representative based on assurances that no student identifiers would be used. District

personnel were engaged to retrieve the data and submit to the researcher only the test score results without student or teacher identifiers present.

The information gleaned from the results of the study of single gender education student data compared to the data from students in coeducational education determined that in this study there were no statistically significant differences between the academic achievement results for students in either program. The interpretations of the research data, based on the research questions, are outlined to provide an overall view of the results found in this study.

Research Question 1

Is there a difference in Measurement of Academic Progress (MAP) math RIT scores for seventh grade females who are enrolled in single gender classes and seventh grade females who are enrolled in traditional coeducational classrooms?

The study was focused on academic achievement outcomes based on the Measures of Academic Progress math RIT scores obtained by seventh grade female students in single gender and coeducational classes. The number of females involved in this study included 121 in single gender classes and 154 in coeducational classes for a total of 275 female data sets. The mean math MAP RIT score for the single gender female students was 232.00 while the mean math MAP RIT score for the female coeducational students was slightly lower at 230.56. As evidenced by the independent samples t-tests, the difference in the scores between the two groups of students was not statistically significant due to a p value of .402 ($p > .05$).

The research also examined the difference in mean math MAP RIT scores within each school. In School A the number of female students enrolled in single gender classes

was 50 while the number of females enrolled in coeducational classes was 93 for a total of 143 female students. The mean of the math MAP RIT scores for the females enrolled in single gender classes, in School A, was 232.22 and the mean math MAP RIT score of the coeducational students enrolled in coeducational classes was 231.41. While the single gender females mean score was higher than the mean score of the coeducational females mean score the difference was not statistically significant due to a p value of .748 ($p > .05$).

The research also examined the difference between the mean math MAP RIT scores for females in School B. In School B there were 71 female students enrolled in single gender classes and 61 female students enrolled in coeducational classes. The mean math MAP RIT score for the females enrolled in single gender classes was 231.85 while the mean math MAP RIT score for the females enrolled in coeducational classes was slightly lower at 229.25. After conducting the independent samples t-test, the results show the differences were not statistically significant due to a p value of .295 ($p > .05$).

In summary, the independent sample t-tests conducted on the aggregate mean math MAP RIT scores of female students, as well as the independent sample t-tests conducted on the mean math MAP RIT scores of females in each school, indicated there was no statistically significant difference in the mean math MAP RIT scores of females in single gender classes compared to those in coeducational classes. The United States Department of Education reports “there is empirical support for the view that single-sex schools may accrue positive outcomes, particularly for young women” (2000, p.18). With the educational policy changes implemented on both the federal and state level, educators may question the merits of single gender programs in regard to the resource investment of

time and money. In this research the results, while not statistically significant, do indicate the female students in single gender classes had higher mean math MAP RIT scores than the females in the coeducational classes.

Research Question 2

Is there a difference in MAP math RIT scores for seventh grade males who are enrolled in single gender classes and seventh grade males who are enrolled in traditional coeducational classrooms?

The study was focused on the academic achievement outcomes based on the Measures of Academic Progress math MAP RIT scores obtained by seventh grade male students in single gender and coeducational classes. The population of male students scores included 127 male students enrolled in single gender classes and 137 male students enrolled in coeducational classes for a total of 264 scores of male students examined. The mean math MAP RIT score for male students enrolled in single gender classes was 231.91 which was slightly lower than the mean MAP math RIT score, 232.12, for male students enrolled in coeducational classes. When the independent samples t-test was conducted there was no statistically significant difference, due to a p value of .917 ($p > .05$) between the scores of single gender male and coeducational male seventh grade students.

The study also examined the difference between the mean math MAP RIT scores within each school. In School A there were 55 seventh grade male students enrolled in single gender classes and 87 seventh grade male students enrolled in coeducational classes for a total of 142 seventh grade male students. In School A, the mean math MAP RIT score was 234.04 for male students in single gender classes and 230.37 for male students in coeducational classes. The independent samples t-test was conducted and the

result was the difference of mean scores was not statistically significant due to a p value of .164 ($p > .05$).

In School B there were 72 seventh grade male students enrolled in single gender classes and 50 seventh grade male students enrolled in coeducational classes for a total of 122 male seventh grade students. The mean math MAP RIT score for single gender male students was 230.29 while the mean math MAP RIT score for coeducational students was 235.16. The independent samples t-test was conducted on the mean scores of male students in School B and indicated the differences were not statistically significant due to a p value of .108 ($p > .05$).

In summary, the independent sample t-tests conducted on the aggregate mean math MAP RIT scores of male students, as well as the independent sample t-tests conducted on the mean math MAP RIT scores of males in each school, indicated there was no statistically significant difference in the mean math MAP RIT scores of males in single gender classes compared to those in coeducational classes. In regard to the mean math MAP RIT scores, the male students in coeducational classes had a higher mean score than the male students in the single gender classes. When these results were examined at the school level, the research indicates the single gender male students in School A had higher mean math MAP RIT scores than their coeducational class counterparts. However, in School B the male students in coeducational classes had a higher mean math MAP RIT score than the males in single gender classes. These mixed results, although not statistically significant could be a result of teacher methodology, student ability, or professional development. In a United Kingdom study the research found there was no difference in performance levels for male students with prior middle

or high performance regardless of whether they were in single gender or coeducational schools (Spielhofer, O'Donnell, Benton, Schagen, and Schagen, 2002, p.48). In light of the educational policy changes allowing single gender education and the resources incumbent in implementing the program, educators may question whether the results can justify the costs associated with the program.

Research Question 3

Is there a difference in MAP reading RIT scores for seventh grade females who are enrolled in single gender classes and seventh grade females who are enrolled in traditional coeducational classrooms?

The study was focused on the academic achievement outcomes based on the Measures of Academic Progress reading RIT scores obtained by seventh grade female students in single gender and coeducational classes. The aggregate number of seventh grade scores examined included 121 female students enrolled in single gender classes and 154 female students enrolled in coeducational classes. The mean reading MAP RIT score for females enrolled in single gender classes was 221.38 while the mean reading MAP RIT score for females enrolled in coeducational classes was slightly lower at 219.05. An independent samples t-test was conducted and indicated no statistical significance between the mean scores of females MAP reading RIT scores due to a p value of .097 ($p > .05$).

Data were also examined for each of the schools in the study. In School A there were 50 seventh grade female students enrolled in single gender classes and 93 seventh grade female students enrolled in coeducational classes for a total of 143 female student mean reading MAP RIT scores examined. The mean reading MAP RIT score for School A female students enrolled in single gender classes was 222.74 which was slightly higher

than the mean MAP reading RIT score, 220.10, of female students enrolled in coeducational classes. The independent samples t-test was conducted and indicated the difference in mean scores was not statistically significant due to a p value of .203 ($p > .05$).

The data for School B was also examined. In School B there were 71 seventh grade female students enrolled in single gender classes compared to 61 seventh grade female students enrolled in coeducational classes. The mean reading MAP RIT score for School B female students enrolled in single gender classes was 222.42 and the mean reading MAP RIT score for female students enrolled in coeducational classes was lower at 217.44. The independent samples t-test was conducted on the School B female mean MAP reading RIT scores and the indication was there was no statistically significant difference between the mean scores due to a p value of .132 ($p > .05$).

In summary, the independent sample t-tests conducted on the aggregate mean reading MAP RIT scores of female students, as well as the independent sample t-tests conducted on the mean reading MAP RIT scores of females in each school, indicated there was no statistically significant difference in the mean reading MAP RIT scores of females in single gender classes compared to those in coeducational classes. In a study by Singh, Vaught, and Mitchell, the girls in single gender classes outperformed the girls in coeducational classes, thereby suggesting that single gender classes offer more advantages for girls than for boys (Singh, Vaught, Mitchell 1998). With the educational policy changes implemented on both the federal and state level, educators may question the benefits of single gender programs in regard to the resource investment of time and money. The results of the research indicate that while the differences between the mean

reading MAP RIT score of single gender females compared to the mean reading MAP RIT score of coeducational females was not statistically significant, the single gender females did have a higher mean reading MAP RIT score than the females in coeducational classes.

Research Question 4

Is there a difference in MAP reading RIT scores for seventh grade males who are enrolled in single gender classes and seventh grade males who are enrolled in traditional coeducational classrooms?

The study was focused on the academic achievement outcomes based on the Measures of Academic Progress reading RIT scores obtained by seventh grade male students in single gender and coeducational classes. The aggregate number of mean reading MAP RIT scores included 127 seventh grade male students enrolled in single gender classes and 137 seventh grade male students enrolled in coeducational classes. The mean reading MAP RIT score for male students enrolled in single gender classes was 218.20 which was near the mean reading MAP RIT score, 218.01, for male students enrolled in coeducational classes. The independent samples t-test was conducted and indicated there was no statistical significance between the mean reading MAP RIT score of male students enrolled in single gender classes and the mean reading MAP RIT score of males enrolled in coeducational classes due to a p value of .902 ($p > .05$).

Data for the mean reading MAP RIT scores was also examined for each school in the study. In School A there were 55 seventh grade male students enrolled in single gender classes and 87 seventh grade male students enrolled in coeducational classes for a total of 142 student scores. The mean reading MAP RIT score for the males enrolled in

single gender classes was 220.09 which was slightly higher than the 217.31 mean reading MAP RIT score for males enrolled in coeducational classes. The independent samples t-test was conducted and indicated the difference in mean scores were not statistically significant due to a p value of .252 ($p > .05$).

Data for the mean reading MAP RIT scores was examined for School B where there were 72 seventh grade male students enrolled in single gender classes and 50 seventh grade male students enrolled in coeducational classes for a total of 122 male student scores. The mean reading MAP RIT score for the males enrolled in single gender classes was lower, 216.76, than the mean reading MAP RIT score, 219.22, for the male students enrolled in coeducational classes. The independent samples t-test was conducted and indicated the difference between the mean reading MAP RIT scores was not statistically significant due to a p value of .255 ($p > .05$).

In summary, the independent sample t-tests conducted on the aggregate mean reading MAP RIT scores of male students, as well as the independent sample t-tests conducted on the mean reading MAP RIT scores of males in each school, indicated there was no statistically significant difference in the mean reading MAP RIT scores of males in single gender classes compared to those in coeducational classes. The aggregate mean reading MAP RIT score for males enrolled in single gender classes was only slightly different than the mean reading MAP RIT score for males in coeducational classes. The single gender male students in School A had a higher mean reading MAP RIT score than the male students in coeducational classes. However, in School B, the male students enrolled in coeducational classes had a higher mean reading MAP RIT score than the male students in single gender classes. These mixed results, although not statistically

significant could again be a result of teacher methodology, student ability, or professional development. In light of the educational policy changes allowing single gender education and the resources incumbent in implementing the program, educators may question whether the results can justify the costs associated with the program.

Conclusions

The purpose of this study was to examine the effect of single gender education on the overall academic achievement of students in reading and mathematics. Educators are tasked with providing proof that concepts or practices work, or do not work, because of the tremendous amounts of money, time, and effort being expended, as well as the sense of urgency generated by the No Child Left Behind legislation. By conducting a quantitative study of MAP testing data, the research may help guide district and state leaders in their decision to implement, or not, single gender education.

The proponents of single gender classes argue that separating the sexes allows each to be taught in a manner meeting his or her gender related learning styles (Sax, 2005, James, 2004, Gurian, 2001, Tyre, 2005). The research into the impact of single gender education on students' academic achievement at two Upstate South Carolina middle schools revealed several interesting aspects. The data examined were the math and reading mean MAP RIT scores from the spring 2009 administration. The research was conducted on the aggregate scores of female students in single gender and coeducational seventh grade classes as well as the aggregate scores of male students in single gender classes as well as coeducational classes. In addition, the data for each school was examined in an effort to determine if differences existed within the schools. The examination of the mean

differences for the data through independent samples t-tests revealed that in all cases the mean differences were not statistically significant.

1. Research question one aimed to examine the mean math MAP RIT score difference between female students enrolled in single gender classes and female students enrolled in coeducational classes. The difference between the aggregate mean math MAP RIT scores for females enrolled in single gender classes was not statistically significant from the aggregate mean math MAP RIT scores for females enrolled in coeducational classes. The mean math MAP RIT score, 232.00, for the single gender females' was higher by 1.44 RIT points than the mean math MAP RIT score, 230.56, for the coeducational females. In School A the mean math MAP RIT score, 232.22, was slightly higher by .80 RIT points than the mean math MAP RIT score, 231.42, of the coeducational female students. In School B the mean math MAP RIT score, 231.85, of females in single gender classes was also higher, 2.65 RIT points, than the mean math MAP RIT score, 229.25, of females enrolled in coeducational classes. In the area of mean math MAP RIT scores, the females enrolled in both School A and School B had higher mean math MAP RIT scores than the females enrolled in coeducational classes.

These results confirm the previous research, which determined single gender female students performed better academically than coeducational female students, conducted by Spielhofer, O'Donnell, Benton, Schagen, and Schagen, 2002, and by Singh, Vaught, Mitchell, 1998. Research conducted in Georgia middle schools by Blake (2012) determined there was a statistically

significant difference in academic achievement between students in single gender classes and those in coeducational classes. While this research study did find a difference in mean math MAP RIT scores between single gender and coeducational female students, it did not confirm the Georgia research in that the differences were not statistically significant. This study did not support the findings of research in West Virginia that determined the math achievement scores for female single gender math students were statistically significant compared to the math achievement scores of female students in coeducational classes (Thom, 2006).

2. Research question two aimed to examine the mean math MAP RIT score difference between male students enrolled in single gender classes and male students enrolled in coeducational classes. The independent samples t-test was conducted and indicated the difference between the mean math MAP RIT scores was not statistically significant for the aggregate scores or for scores from either school. The difference in mean math MAP RIT score, 231.91, for the males enrolled in single gender classes and the mean math MAP RIT score, 232.12, for male students enrolled in coeducational classes was very small, .21 RIT points. However, on further examination of each schools mean math MAP RIT scores there was a much wider difference, although not statistically significant. In School A the mean math MAP RIT score, 234.04, of males enrolled in single gender classes was higher, 3.67 RIT points, than the mean math MAP RIT score, 230.37, of males enrolled in coeducational classes. In School B the mean math MAP RIT score, 235.16, of males enrolled in

coeducational classes was higher than the mean math MAP RIT score, 230.29, of males enrolled in single gender classes by 4.87 RIT points. The male students enrolled in single gender classes at School A had a higher mean math MAP RIT score than the male students enrolled in coeducational classes. In School B, however, the male students enrolled in single gender classes had a lower mean math MAP RIT score than the male students enrolled in coeducational classes.

The results of this study supports the findings of a United Kingdom study in which there was no difference in performance levels for male students with prior middle or high performance regardless of whether they were in single gender or coeducational schools (Spielhofer, O'Donnell, Benton, Schagen, and Schagen, 2002, p.48). The research does not confirm the findings of research conducted regarding student achievement in middle schools in Georgia (Blake, 2012). This study also does not support the findings of Thom (2006) in that there was no statistically significant difference between the mean math scores of male students in single gender classes compared to male students in coeducational classes. The research in this study determined there was no statistically significant difference between the mean math MAP RIT score of single gender males compared to coeducational males, whereas the research on Georgia middle schools revealed statistically significant differences in achievement. The research also does not support the findings of the Australian Council for Educational Research which determined males in single gender

programs outperformed males in coeducational programs to a significant degree. (2002).

3. Research question three aimed to examine the differences in reading achievement between female students in single gender classes compared to females in coeducational classes. The United States Department of Education reports “there is empirical support for the view that single-sex schools may accrue positive outcomes, particularly for young women” (2000, p.18). Although there was no statistically significant difference between the mean reading MAP RIT scores, the female mean reading MAP RIT score, 221.38, was higher than the mean reading MAP RIT score, 219.05, of the females enrolled in coeducational classes by 2.33 RIT points. On further examination of the data for School A, the mean reading MAP RIT score, 222.74, of females enrolled in single gender classes was higher than the mean reading MAP RIT score, 220.10, of females enrolled in coeducational classes by 2.64 RIT points. The data from School B indicates the mean reading MAP RIT score, 220.42, of female students enrolled in single gender classes was higher than the mean reading MAP RIT score, 217.44, of female students enrolled in coeducational classes by 2.98 RIT points.

This research does not support the research conducted on middle school academic achievement in Georgia (Blake, 2012) or in West Virginia (Thom, 2006). In the Georgia research there were statistically significant differences between the achievement levels of single gender students compared to coeducational students while in this study there were no statistically significant

differences. The West Virginia research found that the differences between reading scores between female students in single gender classes was statistically significant different from the reading scores of females in coeducational classes. In relation to the United Kingdom study, the research does confirm that while the female students in single gender classes had higher scores than female students in coeducational classes, the differences were not statistically significant.

4. Research question four aimed to examine the mean reading MAP RIT difference between male students enrolled in single gender classes and male students enrolled in coeducational classes. The independent samples t-test determined the difference between the aggregate mean reading MAP RIT score of male students enrolled in single gender classes and the aggregate mean reading MAP RIT score of male students enrolled in coeducational classes was not statistically significant. On further examination, the aggregate mean reading MAP RIT score, 218.20, of males enrolled in single gender classes was virtually the same as the mean reading MAP RIT score, 218.01, of the male students enrolled in coeducational classes. The data from School A indicates the male students' mean reading MAP RIT score, 220.09, was higher than the mean reading MAP RIT score, 217.31, of the male students enrolled in coeducational classes by 2.78 RIT points. The data from School B indicates the mean reading MAP RIT score, 219.22, of male students enrolled in coeducational classes was higher than the mean reading MAP RIT score,

216.76, of the male students enrolled in single gender classes by 2.46 RIT points.

This study does support the findings of a United Kingdom study, in which the research found there was no statistically significant difference in performance levels for male students with prior middle or high performance regardless of whether they were in single gender or coeducational schools (Spielhofer, O'Donnell, Benton, Schagen, and Schagen, 2002, p.48). The research does not confirm the findings of research conducted regarding student achievement in middle schools in Georgia (Blake, 2012). The research in this study determined there was no statistically significant difference between the mean math MAP RIT score of single gender males compared to coeducational males, whereas the research on Georgia middle schools revealed statistically significant differences in achievement. The results of this study do not confirm the findings of Thom (2006) in which there were statistically significant differences between reading scores for male students in single gender classes compared to reading scores for male students in coeducational classes. The findings of this study do not confirm the findings of the Australian Council for Educational Research which found males in single gender programs to significantly outperform males in coeducational programs. (2002).

The study resulted in two observations by the researcher. First, single gender female students recorded higher mean math and reading MAP RIT scores than the coeducational female students. These results are consistent with other studies which determined that female students in single gender programs performed better academically

when compared to females in traditional coeducational programs (Wagner, 2002, Blake, 2012, Spielhofer, O'Donnell, Benton, Schagen, and Schagen, 2002, and Thom, 2006) .

Additionally, the researcher observed that study results show little difference between male students in single gender classes compared to male students in coeducational classes. These results are in agreement with the United Kingdom research by Spielhofer, O'Donnell, Benton, Schagen, and Schagen (2002). However, the results of this study do not agree with the findings of the ACER (2002) report which indicated boys in single gender programs significantly outperformed their counterparts in coeducational classes. The results of this study also do not agree with the findings of the Study of Georgia middle schools which determined a statistically significant difference between scores for single gender males and coeducational males (Blake, 2012).

In conclusion, there was no statistically significant difference between the mean scores for females and males enrolled in single gender classes compared to the mean scores of females and males in coeducational classes. The data does indicate the mean MAP RIT scores for female students enrolled in single gender classes was higher than the mean MAP RIT scores for female students enrolled in coeducational classes in both math and reading. The females enrolled in single gender classes had slightly higher academic achievement than females enrolled in coeducational classes. However, the results of the research reveal different results for the males enrolled in single gender and coeducational classes. In one school the male students in single gender classes had higher mean scores than the males enrolled in coeducational classes. In the other school, the males in single gender classes had lower mean scores than the males in coeducational classes.

The Elementary and Secondary Education Act, No Child Left Behind (NCLB) allows educational agencies to implement research-based programs aimed at increasing student academic achievement. The stated purpose of NCLB is to “ensure that all children have a fair, equal, and significant opportunity to obtain a high-quality education and reach, at minimum, proficiency on challenging state academic standards and state academic assessments” (United States Congress, 2002, Section 1001). One of the implications of this federal policy was on the implementation of single gender education programs in schools. The policy allows educational units to introduce programs that are research based and that have shown positive results regarding increased student achievement.

Prior studies examined the results of research on the impact of single gender programs on academic achievement and found single gender students performed better academically than coeducational students. The results of this research determined there were positive, although not statistically significant, differences in academic achievement for females enrolled in single gender classes compared to female students enrolled in coeducational classes. The results of this research also determined the mean scores of male students in single gender compared to males in coeducational classes were mixed based on which school the students attended. Results for male students in one school determined the scores of the male single gender students were higher than the scores for male students in coeducational classes. However, in the other school, the results for male students in single gender classes were lower than the scores for male students in coeducational classes. Although the math and reading mean scores for males in single gender and coeducational classes were different, results of independent samples t-tests

determined there were no statistically significant differences between scores in either school.

The results of this study revealed there were no statistically significant differences between the math and reading mean scores of female and male students enrolled in single gender classes compared to math and reading mean scores of female and male students enrolled in coeducational students. The conclusion of the researcher was that, while there were no statistically significant differences revealed in the study, the results did show the female students enrolled in single gender classes had higher mean math and reading scores compared to the females enrolled in single gender classes. The results of the female academic achievement were consistent with previous research both in the United States and abroad. In regard to the academic achievement of male students in single gender classes compared to male students in coeducational classes there again was neither a positive or negative effect on student achievement based on the application of single gender education as a treatment.

In today's environment of accountability and cost awareness, districts must be cognizant of how resources are expended in the effort to increase academic performance. As a result of this study, school and district education officials should not view implementation of single gender programs as a means to increasing student test scores. As determined in this study, there were no statistically significant differences between the academic outcomes of students in single gender classes compared to the academic outcomes of students in coeducational classes. School and district officials could feel confident however, that if they implement single gender program the academic outcomes of these students will not be affected in a negative manner.

Recommendation for Further Research

This study investigated the effect single gender programs had on student achievement in the areas of reading and math as measured by the Measures of Academic Progress (MAP) assessments. Specifically, it examined the mean differences between the achievement of female students in single gender classes compared to female students in coeducational classes in reading and math. Additionally, it examined the mean differences between the achievement of male students in single gender classes compared to male students in coeducational classes in reading and math. The purpose of the study was to research whether there were differences between the single gender students mean MAP RIT scores and the mean MAP RIT scores of coeducational students in order to determine the impact of single gender education on student achievement. The study added to the body of literature on the topic of single gender education and provides direction for further research.

In considering future research in the area of single gender education, one recommendation would be for a study to examine the impact of single gender education on student discipline rates. Specifically, research could examine data to determine whether there is a difference in classroom and school discipline rates between students in single gender and coeducational settings. Male and female student committing discipline infractions could be those same students sitting in classes without their gender specific education needs being met. Research into student discipline rates could determine if there is a difference in how gender specific needs are being addressed in single gender and coeducational programs. Thom (2006) found that student discipline incidents decreased

during the period of study. The research did not specifically examine whether this was a result of the single gender program or a coincidence.

Additionally, future research into the area of attendance based on single gender education could be undertaken to determine differences in rates of attendance between students in single gender classes and those in coeducational classes. A study could be undertaken in this area to examine student perceptions and responses in relation to school attendance. In schools today, there are students sitting in classes who are waiting until they are old enough to leave school because they are not engaged in their own education. These same students may experience attendance issues due to their gender specific needs being unfulfilled. Madigan (2003) reported findings of females' students increased attendance rates due to a feeling of comfort in classes without male students.

Future research could be undertaken to examine the effect single gender education has on different demographic groups. In reflecting on this recommendation the literature seems to indicate there may be some positive impact for minority students in academic achievement and graduation rates. Proponents of single gender programs argue that for some inner-city students, separating the sexes for instruction provides a better learning environment (Singh, Vaught, Mitchell, 1998). A study of Hispanic females in California determined female students in the single gender classrooms reported greater comfort levels, fewer distractions, and less harassment from boys than their peers in the coeducational classrooms. The girls in single gender also had higher attendance rates and grade point averages (Madigan, 2003). However, research in West Virginia determined the academic achievement of minority students was not affected by the implementation of single gender education (Thom, 2006).

Previous research demonstrates the possibility exists that students participating in single gender programs have parents who place greater emphasis on education in general and who are more involved in their children's educational activities. A future research study could be undertaken to determine the impact of parental involvement on student achievement. The research could focus on participation in conferences, parent teacher organizations, and volunteerism. The research could seek to determine if parents of single gender programs are more active and engaged in their children's education compared to parents of students enrolled in coeducational classes.

Future research should be undertaken to determine the growth rate within a school year to determine the impact single gender has on student achievement. Many schools and districts administer some form of pretest and post-test aimed at determining growth throughout the school year. Future studies could examine the differences in the growth rates of single gender students compared to the growth rates of students in single gender classes. Thom (2006) examined the growth, over a two year period, of students who the first year were all in coeducational classes compared to differences in achievement when all of the same students were in single gender classes. That research determined statistically significant differences in both reading and math achievement scores.

Research into single gender education has demonstrated there is an effect on student achievement for students. How much of this is due to the specific practices employed by teachers and how much is due to the removal of the opposite gender suggest more research needs to be done to investigate the importance of each. In the study the Latina students in California, the females reported greater comfort levels and fewer distractions whereas the females in coeducational classes reported feeling tense and

guarded. The girls in single gender classes also reported being less distracted and frustrated due to teasing from the boys. Possibly due to the greater comfort levels and fewer distractions, the Latina girls in single gender classes demonstrated higher grade point averages than Latina girls in coeducational classes (Madigan, 2003).

Additionally, prior research conducted by Dee (2006), Thom, (2006), and Wagner (2002) concerning teacher gender could be expanded to determine if there are correlations between the teacher gender and academic achievement of single gender students of the same gender. These researchers found that male students taught by male teachers performed at higher rates than male students taught by female teachers. Dee and Wagner also found that female students taught by female teachers performed better than female students taught by male teachers. Thom found that the math achievement of female students was greater than that of male students and surmised the reason might have been that five of the six math teachers were female. Several questions arise as to why these results were found. Perhaps the difference can be attributed to the gender specifics found in brain development regarding differences in sight, hearing, and autonomic responses.

If professional development concerning gender specific learning preferences was provided to all teachers, future research could be conducted to determine if academic achievement was impacted. The premise here is based on the gender specific learning style needs of each gender and the implementation of teaching strategies to address these needs. One hypothesis could be that if knowing these strategies have an effect on student achievement in single gender classrooms, then they should also be able to be effective in coeducational classrooms.

Throughout the field of research concerning single gender education there are those who advocate for the programs (Sax, 2005, Deak, 2008, James, 2007, Gurian and Stevens, 2005, and Rowe, 2000) and those who consider it a detriment to certain students (Halpern, Eliot, Bigler, Fabes, Hanish, Hyde, Liben, and Martin, 2011, Thomas and Ungerleider, 2004, American Civil Liberties Union, 2006 and 2007, Sadker and Zittleman, 2005, and Gandy, 2006). While this research added to the study of the impact single gender had on student achievement, further research could be conducted to expand the understanding and practice in the field. As schools and districts continue to search for ways to increase student achievement these recommendations for future study could lead to findings on learning preferences of students. Many schools and districts have offered “choice” programs aimed toward helping students reach their fullest potential. Single gender programs could be one of those choice programs educators could feel confident in implementing and obtaining results which would justify the expenditure of resources.

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