SINGLE GENDER LANGUAGE ARTS CLASSES AND THE IMPACT ON ACHIEVEMENT OF MALES

by

Brock Wimberley English

Liberty University

A Dissertation Presented in Partial Fulfillment
Of the Requirements for the Degree
Doctor of Education

Liberty University
Summer, 2014
SINGLE GENDER LANGUAGE ARTS CLASSES AND THE IMPACT ON

ACHIEVEMENT OF MALES

by Brock Wimberley English

A Dissertation Presented in Partial Fulfillment

Of the Requirements for the Degree

Doctor of Education

Liberty University, Lynchburg, VA

Summer, 2014

APPROVED BY:

Grina G. Holman, Ed.D., Chair

Meredith P. Furrow, Ed.D., Committee

James T. Harbin, Ph.D., Committee

Scott B. Watson, Ph.D., Associate Dean of Advanced Programs
ABSTRACT

The purpose of this causal comparative research design was to analyze the relationship between Language Arts scale scores of elementary male students on the Mississippi Curriculum Test, Version 2 (MCT2) and the type of classroom, mixed-gender or single-gender. The study also analyzed the percentage of questions answered correctly on the MCT2 in the English Language Arts sub-categories of vocabulary, reading comprehension, writing, and grammar. Archival data of 222 students was used, 100 male students in single-gender classes and 122 students in mixed-gender classes. The study was conducted in an urban elementary public school with a diverse population in northeast Mississippi. The study did not reveal any significant differences in the overall achievement of third and fourth grade males in single-gender classes compared to mixed-gender classes; however, significant differences were found in fifth grade overall scale scores in the single-gender classes. Furthermore, the study did not reveal any significant differences in the percentages of questions answered correctly in vocabulary, reading comprehension, writing, and grammar of third and fourth grade males in single-gender classes. However, significant differences were found in the overall percent correct for fifth grade reading comprehension and writing. Results indicate there is no advantage in terms of achievement in English Language Arts for third and fourth grade males in single-gender classes, but there is a moderate effect of single-gender education on fifth grade scale scores, reading comprehension, and writing. Suggestions for further research are also included.

Keywords: single-gender education, brain-based learning, Mississippi Curriculum Test, Version 2 (MCT2), Theory of Multiple Intelligences, male achievement, English Language Arts, vocabulary, reading comprehension, writing, grammar.
Dedication

This dissertation is dedicated to my daddy, Garry English, and my wife, Emilie English. My daddy taught me to persevere and to always give it my all. Even though he passed away two years ago, I could hear him urging me on every time I would get discouraged. I miss you daddy, but I know you are always with me. To my beautiful wife, Emilie, I thank you for standing beside me throughout this journey. I realize I sacrificed a great deal of family time, but you were always there cheering me on. You will never know how much it meant to me to have your support during this process. I love you, Sunshine.
Acknowledgements

First and foremost I would like to thank God for guiding me through this process. Through lots of prayer, reading of the Scripture, and moments of silence, I have come to the end of my journey. Though the journey was filled with its highs and lows, God was with me every step of the way. Whether it was me talking to Him late at night or picturing His face on the wall as I typed, God was truly my center.

I would also like to thank my dissertation committee. Dr. Holman, Dr. Furrow, and Dr. Harbin have provided guidance and support each step of the way. Dr. Holman, words cannot express how much your kind words of support meant to me. We began this journey as dealers of hope, and I am forever grateful for helping me stay positive. I truly believe God placed you as my chair because he knew I needed someone like you to help me stay focused on the mission at hand. Dr. Furrow, thank you also for your words of support. You asked questions that made me think about why I chose certain aspects of the topic. You helped me think more critically about the end product. Dr. Harbin, you have been my mentor for almost five years. You are the reason I have arrived at this destination in my career. You took a chance on me five years ago, and you have stuck by me as a mentor, but most importantly as a friend.

Finally, I must acknowledge my family - Emilie, Curt, and Charlie. They have taken this journey with me, and I am forever grateful for their love and support. There were many times during the process that I was at home physically, but not at home in spirit and mind. I thank them for taking my mind off school every now and then and for helping me realize this is not the most important thing in my life. You have all made me a better person.
# Table of Contents

ABSTRACT .................................................................................................................. 3

Dedication .................................................................................................................. 4

Acknowledgements ..................................................................................................... 5

List of Tables ............................................................................................................... 9

List of Figures ........................................................................................................... 11

CHAPTER ONE: INTRODUCTION ............................................................................. 12

Introduction ............................................................................................................... 12

Background ............................................................................................................... 12

Problem Statement .................................................................................................... 13

Purpose Statement ..................................................................................................... 14

Significance of Study ................................................................................................. 15

Research Questions and Hypotheses ....................................................................... 16

Identification of Variables ......................................................................................... 18

Definitions ................................................................................................................. 19

CHAPTER TWO: REVIEW OF THE LITERATURE ....................................................... 22

Introduction ............................................................................................................... 22

Theoretical Framework ............................................................................................ 23

Learning Theories ..................................................................................................... 24

Literacy ....................................................................................................................... 41
Research Results .................................................................................. 126

Summary .......................................................................................... 141

CHAPTER FIVE: DISCUSSION................................................................. 144

Summary of Findings ........................................................................ 144

Research Question 1: Overall Scale Scores in Language Arts ............... 145

Research Question 2: Percentage Correct in Vocabulary, Reading Comprehension, Writing, and Grammar ......................................................... 146

Discussion ......................................................................................... 148

Limitations ....................................................................................... 149

Implications ...................................................................................... 153

Recommendations for Future Research ................................................ 155

Conclusion ........................................................................................ 157

REFERENCES .................................................................................. 160

APPENDIX ........................................................................................ 190

Appendix A: Institutional Review Board Approval .................................... 190

Appendix B: Instrument ..................................................................... 191
List of Tables

Table 1 The Gender Test-Score Gap................................................................. 76
Table 2 Performance Levels for MCT2 Language Arts....................................... 95
Table 3 Descriptive Statistics for Scale Scores.................................................. 103
Table 4 Overall Scale Score Third Grade........................................................ 104
Table 5 Overall Scale Score Fourth Grade....................................................... 105
Table 6 Overall Scale Score Fifth Grade......................................................... 106
Table 7 Overall Percent Correct in Vocabulary................................................. 107
Table 8 Overall Percent Correct in Third Grade Vocabulary............................ 108
Table 9 Overall Percent Correct in Fourth Grade Vocabulary........................... 109
Table 10 Overall Percent Correct in Fifth Grade Vocabulary............................. 110
Table 11 Overall Percent Correct in Reading Comprehension............................ 111
Table 12 Overall Percent Correct in Third Grade Reading Comprehension........... 112
Table 13 Overall Percent Correct in Fourth Grade Reading Comprehension........ 113
Table 14 Overall Percent Correct in Fifth Grade Reading Comprehension.......... 114
Table 15 Overall Percent Correct in Writing................................................... 115
Table 16 Overall Percent Correct in Third Grade Writing............................... 116
Table 17 Overall Percent Correct in Fourth Grade Writing................................ 117
Table 18 Overall Percent Correct in Fifth Grade Writing.................................. 118
Table 19 Overall Percent Correct in Grammar.................................................. 119
Table 20 Overall Percent Correct in Third Grade Grammar............................. 120
Table 21 Overall Percent Correct in Fourth Grade Grammar............................ 121
Table 22 Overall Percent Correct in Fifth Grade Grammar
Table 23 One-way ANOVA for Third Grade Scale Scores
Table 24 One-way ANOVA for Fourth Grade Scale Scores
Table 25 One-way ANOVA for Fifth Grade Scale Scores
Table 26 One-way ANOVA for Third Grade Overall Percent Correct Vocabulary
Table 27 One-way ANOVA for Third Grade Overall Percent Correct Reading
Table 28 One-way ANOVA for Third Grade Overall Percent Correct Writing
Table 29 One-way ANOVA for Third Grade Overall Percent Correct Grammar
Table 30 One-way ANOVA for Fourth Grade Overall Percent Correct Vocabulary
Table 31 One-way ANOVA for Fourth Grade Overall Percent Correct Reading
Table 32 One-way ANOVA for Fourth Grade Overall Percent Correct Writing
Table 33 One-way ANOVA for Fourth Grade Overall Percent Correct Grammar
Table 34 One-way ANOVA for Fifth Grade Overall Percent Correct Vocabulary
Table 35 One-way ANOVA for Fifth Grade Overall Percent Correct Reading
Table 36 One-way ANOVA for Fifth Grade Overall Percent Correct Writing
Table 37 One-way ANOVA for Fifth Grade Overall Percent Correct Grammar
List of Figures

Figure 1. Probability Plot of Overall Scales Scores of Males in Mixed Gender Classes ........125

Figure 2. Probability Plot of Overall Scales Scores of Males in Single Gender Classes ........126
CHAPTER ONE: INTRODUCTION

Introduction

With males lagging behind females in reading achievement from elementary school through high school, many school districts are implementing single-gender education as a means to close the achievement gap (Grigg, Daane, Ying, & Campbell, 2003; Mullis, Martin, Gonzalez, & Kennedy, 2003; Organisation for Economic Co-operation and Development, 2001). As of the fall of 2012, more than 500 public schools in the United States offer single-gender educational opportunities. About 390 of these schools are mixed-gender schools with single-gender classrooms as well as mixed-gender classrooms (NASSPE, n.d.). Using Howard Gardner’s Theory of Multiple Intelligences (1983) and the brain-based research of Jensen (1998) and Sousa (2001), the researcher aims to analyze the impact a single-gender classroom has on the Language Arts scores of elementary males compared to the Language Arts achievement scores of males in mixed-gender classes. For the purpose of the study, Language Arts refers to vocabulary, reading comprehension, writing, and grammar. The quantitative study uses a causal-comparative design, also known as an ex post facto design, to analyze the relationship between the variables of the type of classroom and student achievement in Language Arts.

Background

The analysis of the effect of single-gender classes on the scholastic achievement of elementary male students in Language Arts is an unexplored avenue in the state of Mississippi’s public educational system. However, there is empirical evidence proving elementary-male students thrive in a single-gender classroom compared to a mixed-gender classroom. Researchers report the fact the classes are more focused, the male students are more focused, and the teachers are developing gender-specific strategies to improve Language Arts achievement.
The goal is to identify and respond to why there is an underachievement of males, even in situations where unconventional solutions have been presented (Cleveland, 2011).

Most single-gender classes are rooted in the thesis that females and males learn differently. Researchers Gong, Rosa-Neto, Carbonell, Chen, He, and Evans (2009) provide a theoretical framework to support the notion of neuroanatomical differences between the genders and differences in cognitive performance. Driving these frameworks are several known characteristics of the way males and females learn that will be discussed later.

**Problem Statement**

Careful analysis of data from the Mississippi Curriculum Test, Version 2 (MCT2) exposes a widening gap between males and females when it comes to reading and writing (Conlin, 2003). Prevalent ideology suggests several causes for this divide – approaches to learning, cognitive development, attitudes, and teacher characteristics (Gurian & Stevens, 2004). However, the type of classroom is one aspect of the achievement gap with minimal research studies explored. Single-gender and mixed-gender classrooms, in theory, contain a learning environment similar in curriculum, yet opposite in class makeup and teaching strategies. One must ask the question, “Would a single-gender classroom close the gap in Language Arts between males and females, and in the process, develop an attitude and motivation in males not observed in a mixed-gender class?”

One of the leading researchers in single-gender education, Leonard Sax, states how the separation of genders in a school setting, with a focus on tailoring to the needs of each gender, improves student achievement (2007). However, it is not enough to say that exposure to a single-gender class is an end-all to the learning discrepancies between males and females, but it is an avenue that must be pursued for differentiating instruction. With the National Assessment
of Educational Progress (NAEP) data consistently showing a large gap favoring females in reading, international and national studies have been conducted to help understand why this happens (Bracey, 2006). It appears that males are being educated in a system uninformed in the following areas: the male learning style, the gap between the male learning style and what is being taught in classrooms today, the role of the parents and the community in educating males, and methods, strategies, and teaching techniques that have been proven to be effective when educating males (Gurian & Stevens, 2005).

**Purpose Statement**

Improving the Language Arts scores of males on the Mississippi Curriculum Test (Version 2) requires careful analysis of the type of classroom in which elementary male students are enrolled, specifically a mixed-gender or a single-gender classroom. Is there a relationship between the type of classroom and elementary male student achievement in Language Arts? The purpose of the study is to analyze the relationship between the Language Arts scale scores of elementary male students on the Mississippi Curriculum Test (Version 2) and the type of classroom, whether it is mixed-gender or single-gender. The study is twofold: (a) to examine the MCT2 Language Arts scale scores of elementary male students in grades three, four, and five and (b) to examine the relationship of the type of classroom on those scores, whether it is single-gender classes or mixed-gender classes. The constructs from which the research will be guided are the role of the brain in teaching and learning, the impact of teaching to the way students learn, and effective strategies to use to maximize success for male students. Using the causal-comparative design, this study will enable future researchers with evidence of whether or not the type of classroom is related to the development of Language Arts skills and male achievement. Careful analysis of the reported findings would allow educators to determine strategies to use.
Furthermore, biological inferences gleaned from the study would seek to improve reading and writing achievement for males in elementary school.

Language Arts, specifically reading and writing, does not always equate to achievement for males. Researchers have hypothesized that some males do not read early in life and by the time their skills catch up to the females they usually focus on other things to pass the time (e.g., James, 2007). Some neuroscientists report that men excel at spatial tasks and women excel verbally (e.g., Gorman, 2010). The aforementioned information brings to the forefront issues concerning the education of males in schools today, especially learning strategies being taught by teachers, but more importantly, the type of classroom males are exposed to on a daily basis. The underlying premise for exploration of such a study is the improvement of student learning for males, and in the process, understanding the mental, physical, and emotional aspects of males in general will provide educators with the necessary strategies to ensure student success.

**Significance of Study**

According to the U.S. Department of Education, males are an average of a year to a year and a half behind females in reading and writing (Gurian & Stevens, 2005). Leonard Sax mentions a poignant reason in his book *Why Gender Matters*. According to Sax (2005), “The education establishment has indoctrinated teachers and parents in the dogma that girls and boys should be taught the same subjects in the same way at the same time (p. 235).” Males are falling behind, yet there is evidence the educational system is setting them up for failure.

Using the causal-comparative design, this study will enable future researchers with evidence of whether or not the type of classroom is related to the development of Language Arts skills and male achievement. Careful analysis of the reported findings would allow educators to
determine strategies to use. Furthermore, biological inferences gleaned from the study would seek to improve Language Arts achievement for males in elementary school.

If schools are to provide the community with the necessary information to promote the achievement of males in skills predominantly mastered quicker by females, then they will have to do their part to equip teachers with the strategies characteristic of each gender. The study may suggest no relationship between the type of classroom and Language Arts scores. However, teachers will at least garner a better understanding of the implications of the 1% difference in the size and structure of the male brain and the female brain and its impact on gender-specific teaching and learning styles to use in the classroom (Cahalan, 2010).

Research Questions and Hypotheses

The research questions and the null hypotheses addressed in the study are the following:

**RQ1.** Does the type of classroom (single gender vs. mixed gender) have an impact on grades three, four, and five male students’ Mississippi Curriculum Test, Version 2 (MCT2) scale scores in Language Arts?

**Null Hypothesis 1-1.** There is no significant difference in third grade male students’ MCT2 scale scores in Language Arts in single gender classrooms as compared to a mixed gender classroom.

**Null Hypothesis 1-2.** There is no significant difference in fourth grade male students’ MCT2 scale scores in Language Arts in single gender classrooms as compared to a mixed gender classroom.

**Null Hypothesis 1-3.** There is no significant difference in fifth grade male students’ MCT2 scale scores in Language Arts in single gender classrooms as compared to a mixed gender classroom.
RQ2. Does the type of classroom (single gender vs. mixed gender) have an impact on grades three, four, and five male students’ Mississippi Curriculum Test, Version 2 (MCT2) percentage of questions answered correctly in vocabulary, reading comprehension, writing, and grammar in Language Arts?

Null Hypothesis 2-1. There is no significant difference in third grade male students’ MCT2 percentage of questions answered correctly in vocabulary in Language Arts based on the type of classroom (single gender vs. mixed gender).

Null Hypothesis 2-2. There is no significant difference in third grade male students’ MCT2 percentage of questions answered correctly in reading comprehension in Language Arts based on the type of classroom (single gender vs. mixed gender).

Null Hypothesis 2-3. There is no significant difference in third grade male students’ MCT2 percentage of questions answered correctly in writing in Language Arts based on the type of classroom (single gender vs. mixed gender).

Null Hypothesis 2-4. There is no significant difference in third grade male students’ MCT2 percentage of questions answered correctly in grammar in Language Arts based on the type of classroom (single gender vs. mixed gender).

Null Hypothesis 2-5. There is no significant difference in fourth grade male students’ MCT2 percentage of questions answered correctly in vocabulary in Language Arts based on the type of classroom (single gender vs. mixed gender).

Null Hypothesis 2-6. There is no significant difference in fourth grade male students’ MCT2 percentage of questions answered correctly in reading comprehension in Language Arts based on the type of classroom (single gender vs. mixed gender).
Null Hypothesis 2-7. There is no significant difference in fourth grade male students’ MCT2 percentage of questions answered correctly in writing in Language Arts based on the type of classroom (single gender vs. mixed gender).

Null Hypothesis 2-8. There is no significant difference in fourth grade male students’ MCT2 percentage of questions answered correctly in grammar in Language Arts based on the type of classroom (single gender vs. mixed gender).

Null Hypothesis 2-9. There is no significant difference in fifth grade male students’ MCT2 percentage of questions answered correctly in vocabulary in Language Arts based on the type of classroom (single gender vs. mixed gender).

Null Hypothesis 2-10. There is no significant difference in fifth grade male students’ MCT2 percentage of questions answered correctly in reading comprehension in Language Arts based on the type of classroom (single gender vs. mixed gender).

Null Hypothesis 2-11. There is no significant difference in fifth grade male students’ MCT2 percentage of questions answered correctly in writing in Language Arts based on the type of classroom (single gender vs. mixed gender).

Null Hypothesis 2-12. There is no significant difference in fifth grade male students’ MCT2 percentage of questions answered correctly in reading comprehension in Language Arts based on the type of classroom (single gender vs. mixed gender).

Identification of Variables

The primary variable of interest is the MCT2 Language Arts scale scores of elementary male students in grades three, four, and five at an urban, elementary school. The student scale scores on the MCT2 is the dependent variable. The independent variables are the type of classroom in which the male students were enrolled – that is, a single-gender or mixed-gender
classroom. The proposed study consists of two independent variables and one dependent variable.

Definitions

The following terms were identified for purposes of this study:

6 + 1 Traits of Writing – A writing program that emphasizes teachers using writing instruction that analyzes students writing using a set of characteristics or traits: ideas, organization, voice, word choice, sentence fluency, conventions, and presentation (Culham, 2003).

Behaviorism – Its major concern is observable behavior, not thinking and emotions associated with internal events (McLeod, 2007a).

Brain-based learning – It transforms educators into memory enhancers instead of the common practices of rote memorization for the dissemination of information (Willis, 2006).

Constructivism – Knowledge is created by the individual’s own experiences (Trotter, 1995).

Differentiated instruction – A teaching theory in which instructional practices vary according to the needs of individual and diverse students (Tomlinson, 2001).

Direction instruction – Instruction that is led by the teacher (Rosenshine, 2008).

Inquiry-based learning – An educational pedagogy which uses a non-lecture format with the instructor functioning as a facilitator (Volkert, 2012, p. 15).

Language Arts – One part of the Mississippi Curriculum Test (Version 2) that students are required to take during the spring of every school year. It consists of four sub-components: vocabulary, reading comprehension, writing, and grammar (Office of Student Assessment, 2011).
Learning styles – This is an individual’s preferred way of learning (Santo, 2006).

Mississippi Curriculum Test, Version 2 – The test is yearly. It is given to students in grades three through eight. The test is based on the Mississippi state standards, which define what students should be learning each year. Tests are given in Mathematics and Language Arts (Office of Student Assessment, 2011).

Mixed-gender classes – These are classrooms with both male and female students (Thair, 2004).

Neuroanatomical differences – These are differences in the structure of the nervous system between males and females (Sax, 2005).

Scale scores – Scale scores are statistical conversions of raw scores that adjust for variations in the difficulty of items in different tests and permit valid comparison across all test administrations within a particular subject area or grade (Office of Student Assessment, 2011).

Single-gender classes – They are legal options in grades K-12. Schools implement them as a way to engage and motivate students. They are also seen as a way to meet students’ needs (Chadwell, n.d.).

Social Learning Theory – It deals with how behavior is learned through the process of observations (Bandura, 1977).

Theory of Cognitive Gender Differences – It relates to the mental functions of males and females (Cahill, 2005).

Theory of Multiple Intelligences - It focuses on the fact that humans have varying ways of learning and processing information (Gardner, 1983).

Tolerance for ambiguity - It deals with three contexts: new situations, complex situations, and contradictory situations (Budner, 1962).
**Written expression** - It is a combination of cognitive, linguistic, and motor abilities (Wendling and Mather, 2009).
CHAPTER TWO: REVIEW OF THE LITERATURE

Introduction

In May of 2013, a popular show on National Geographic Television called *Brain Games* highlighted differences in male and female brains (Kolber, 2013). With the premise that the brain of each gender is wired differently, the show explored synaptic responses in the brain of each gender during a set of activities. Several of the findings from the activities include: oral reading of literature only enacted the left hemisphere of the male brain; male brains are stimulated by risks and challenges; and males, while they may not be able to explain why, are better at spatial reasoning (O’Connor, 2013). These findings are relevant for educators because they allow them to adapt to the needs of each student by providing activities designed specifically for different areas of the brain.

The following chapter begins a discussion on the debate behind single-gender education followed by the theoretical framework of why males and females learn differently and the research on Brain Theory, theory of cognitive development, and the Theory of Multiple Intelligences. Next, it provides an analysis about what researchers state about the widening achievement gap in literacy between males and females. Additional topics include how the *No Child Left Behind Act of 2001* opened the door for single-gender education opportunities, gender-specific teaching strategies that benefit males, and a comparison of achievement of males in single-gender classes and mixed-gender classes from previous research. The chapter concludes with a summary of how the current study fills a need in education at the present time, and the focus of the gap is the role of single-gender education in improving Language Arts scores of males in elementary school. While research has given clues as to how and why males learn the way they do, little has been purported as to the organizational structure of the school and how it
can aid in increasing male achievement in Language Arts. To address the academic problems of male students in certain subject areas, organizational structures, or alternative settings, are sometimes used (Jackson, 2008).

These topics help provide support to understand the research question underlying this proposal: What is the effect of single-gender classes on the English Language Arts achievement of males in elementary school?

**Theoretical Framework**

Two theories surrounding the field of education lay the groundwork for single-gender education - constructivism and behaviorism. Constructivism is a child-centered theory in which the student uses discovery learning to make sense of his or her surroundings; behaviorism, on the other hand, deals with observable behavior, instead of thinking and emotions (McLeod, 2007a). The section that follows shows the key theorists of each theory, the theorists learning theory, and finally its impact on education.

The research on how the development and function of the brains in boys and girls differs offers insights for educators to use in teaching and learning. Brain-based learning focuses on areas of the brain and their specialization (Jensen, 1998; Sousa, 2006). The focus on brain-based learning has just recently been applied to education, and it is one of the rationalizations for using single-gender education. Modern theorists analyzed the existence of anatomic sex differences in the organization of female and male brains. Boys and girls learn differently, but that does not mean one is better than the other. Yet, it does suggest that how they learn and how they are taught should correlate.
Learning Theories

Psychologists, researchers, and educators developed theories to describe specific mental and physical processes that occur during learning. Constructivism, behaviorism, cognition, and multiple intelligences are just a few of those theories utilized to describe the learning process. The role of the single-gender educator is to decide which one works best with his or her classroom. In terms of constructivism, the classroom learner is not the sole force of knowledge construction, but knowledge construction is generated through cooperative learning. This leads to the importance of collaborative problem-based learning in the constructivist classroom (Hyslop-Margison & Strobel, 2008). In contrast, behaviorism is more teacher-centered, where the teacher delivers the information to the student instead of the student constructing his or her own knowledge of the concept. This could lead to learning skills in isolation (Gonzalez, n. d.). While both processes are still used in classrooms today, the single-gender setting for males correlates more with the use of constructivism, especially in decreasing discipline referrals (Sago, 2011).

In addition to behaviorism and constructivism, brain-based learning and the Theory of Multiple Intelligences (1983) are also relevant to single-gender education. Brain-based learning, according to Willis (2006), transforms educators into memory enhancers instead of the common practices of rote memorization for the dissemination of information. In addition to enhancing memory, brain-based learning aids in the chunking of information, improving recall and learning, stimulating multiple senses, and promoting interactivity (Pilcher, 2012). The Theory of Multiple Intelligences, much like brain-based learning, appeals to the multiple senses of the learner. With classrooms encompassing diverse learners, from different backgrounds, with a variety of learning styles, using the Theory of Multiple Intelligences might enhance the
performance levels of those students (Gouws & Dicker, 2011). The use of the theory, in addition to theories such as constructivism, allows teachers who use these multiple approaches to reach the multiple intelligences prevalent in today’s classrooms (p. 585).

**Constructivism.** Constructivism contends that knowledge is created by the individual’s own experiences (Trotter, 1995). Constructivist teachers do not recite knowledge for students to memorize, but instead, they are facilitators who provide students with an environment in which they can grow their knowledge (p. 25). A key element to constructivism is the fact that learning is active, and discovery and inquiry are common characteristics of this type of learning. In a constructivist classroom, the teacher creates situations that will foster the students mental constructs, a somewhat different approach than the traditional classroom.

In terms of how constructivism relates to single-gender education, one of the principles of constructivism is understanding how students learn. A constructivist classroom engages the learner by providing problems, using cooperative learning, and offering choices. In terms of discipline, a study conducted Stephanie Sago (2011) revealed a small, but statistically significant decline in minor discipline referrals for adolescent black males in a single-gender grouping where the constructivist theory was the basis for the class.

Constructivism in the classroom patterns itself after either Piaget’s theory related to individual constructivism or Vygotsky’s social constructivism. Noted by Kalina and Powell (2009) as the best method of teaching of teaching and learning, the goal of the constructivist teacher is to blend philosophies from both theorists into effective practice in the classroom. Characteristics such as inquiry teaching and learning and students building meaningful concepts from existing knowledge are similar to both individual and social constructivism, while the key difference is the order of development of language, whether language is first or thinking is first
(p. 244). The constructivist teacher uses the unique traits from each theory to create a learning environment where students are free to experience meaningful practices. Kalina and Powell notate those practices include: learning through relatable examples, selecting personal topics related to a writing assignment, creating a learning environment where honesty and trust are effortless, and allowing students to speak and express their views in a non-threatening environment (p. 247-248). The student and the teacher benefit from a constructivist learning environment that is both facilitative and interactive (p. 249).

**Jerome Bruner.** Jerome Bruner, a renowned psychologist in the 20th century, was a key figure during the cognitive period, and he was extremely influential in the field of education (Smith, 2002). While a professor at Harvard, Bruner became interested in the cognitive development of children and the impact on the educational process. His educational theories during the 1960’s and 1970’s influenced educational programs during that time period (Takaya, 2008). Bruner stressed the importance of understanding the culture and context of learning, and how the child interprets meaning from those experiences (p. 2). The ideas of “readiness for learning” and the spiral curriculum were also introduced by Bruner. These two terms related to teaching a subject to a child at any developmental level in such a way to fit with the child’s abilities at that time. With the focus moving from the teacher to the student, the learner is able to interact with objects and events to gain understanding (Bruner, 1960). Bruner wanted students to be able to invent concepts for themselves (McLeod, 2012). However, Bruner’s views have transformed over the past fifty years. His initial views of education focused on the transmission of one’s culture. The teacher simply found the part of the student’s culture most transmittable, and then focused on that characteristic as a means of disseminating information. Bruner’s most
current view of education relies on using culture as the context for multiple meanings and communication and a focus on various modes of learning (Takaya, 2008).

In 1966, Bruner developed three modes of representation based on his research into the cognitive development of children. The three modes of representation include: enactive representation (action-based), iconic representation (image-based), and symbolic representation (language-based) (Bruner, 1966). The enactive stage takes place during infancy, and it deals with action-based information and muscle memory. In both infants and adults, performing motor tasks can be difficult to describe in pictures and words. The second stage, the iconic stage, stores memory as images; the implication for this stage is to create diagrams or pictures to represent information. The iconic stage occurs from 1-6 years old. The symbolic stage, ages 7 and up, is where information is stored as a code, such as language. This stage leads to the constructivist theory because symbols can be manipulated and are flexible; it is the most adaptable form of Bruner’s representations (Bruner, 1966).

Constructivist Theory. As part of Bruner’s constructivist theory, children as well as adults do best when progressing through the three modes of representation. Bruner (1966) suggests the learner is able to learn any new material if the material is presented appropriately. Using constructivism as not only a philosophy but an educational practice, Bruner (1966) emphasized understanding the structure of the subject being studied, engaging in active learning, and understanding the value of learning. The learner engages in discovery learning by obtaining knowledge themselves through experiences and background knowledge. The teacher simply enhances the educational experience of the child by transforming the material in such a way that it is relatable to the child at his or her level. The teacher encourages students to find answers on their own, while also engaging in the Socratic Method to form an active dialogue. In terms of
the spiral curriculum, teachers should organize material so that students build upon material they have already learned (Bruner, 1966).

*Impact on education.* Bruner (1961) believed education is not just the dissemination of knowledge from teacher to student, but more of a teacher as facilitator where children develop thinking and problem-solving skills that can then be applied to any situation. As an example, teachers could design lessons that allow students to organize information for themselves. This is the concept of discovery learning.

Bruner’s (1960) *Process of Education* offered several suggestions for teachers. For teachers, he suggested the importance of sharing ideas of how to make connections between subjects and how to ensure students learn. He also suggested teachers need to know at what stage of the intellectual process students are and what it will take to further develop that particular stage. Guessing at answers and taking risks are also considered effective aspects of instruction. In terms of gender education, Gurian and Stevens (2005) suggest risk taking and impulsive responses give males an excitement and charge. Finally, through the process of discovery and inquiry, students are able to work in cooperative groups to solve problems, form hypothesis, and ask questions.

*Jean Piaget.* Swiss psychologist Jean Piaget (1896-1980) was the first psychologist to study and analyze cognitive development. Some of his contributions to the field include: the theory of cognitive child development, observational studies of cognition in children, and tests that revealed different cognitive abilities (McLeod, 2009). Piaget was concerned with a holistic approach to learning, and he emphasized child-centered learning. He sought to understand how children’s minds work, and he was able to develop insight into the fact children will be able to learn certain concepts when they are developmentally ready (Atherton, 2011). He proposed four
stages of cognitive development that form the basis of most school curricula today. It suggests students should be taught material at certain stages. Teachers use arguments from Piaget to help explain why instructional practices and curricula are not suitable developmentally for certain students (Hinde & Perry, 2007).

Theory of Cognitive Development. Piaget’s four stages of cognitive development include: sensorimotor, pre-operational, concrete operational, and formal operational. The sensorimotor stage is from birth to two years old. The characteristics of this stage include: making use of memory, imitation, and thought, understanding objects still exist even when hidden, and moving from reflex actions to goal-directed activity. The pre-operational stage is from two-seven years old. The characteristics of this stage include: using language to think symbolically, thinking operations through logically in one direction, and having difficulty understanding other points of view. The concrete operational stage is from seven to eleven years old. The characteristics of this stage include: solving concrete problems, understanding laws conservation, and the ability to classify, and understanding reversibility. Finally, the formal operational stage takes place from eleven to fifteen years old. This stage includes children’s ability to solve abstract problems, thinking scientifically, and developing concerns about social issues and identity (Wadsworth, 1996).

Impact on education. Jean Piaget sought to understand how intellectual growth was a process of adaptation. Much like Jerome Bruner, Piaget believed discovery learning was central to school. He also stressed that students should not be taught certain concepts until they are developmentally ready, and also like Bruner, the teacher is a facilitator and focuses on child-centered instruction (McLeod, 2009). According to Central Advisory Council for Education (1967), several themes associated with Piaget and education include: individualized learning, a
flexible curriculum, the importance of play in learning, the use of the learning arrangement or environment, discovery learning, and the importance of monitoring children’s progress.

**Lev Vygotsky.** Russian psychologist Lev Vygotsky (1896-1934) analyzed the social interactions of individuals and the impact on cognitive development. He focused on social interactions and how they develop cognition, and he stressed the importance of the community in making meaning of experiences. He did share some of the same understandings as Piaget, especially in regards to discovery learning. However, he differed with Piaget by suggesting the role of society in educating the child, whereas Piaget focused more on self-initiated discovery (McLeod, 2007b). Vygotsky is best known for his sociocultural theory, a theory related to cognitive development (Gallagher, 1999). The second element of the theory, known as the zone of proximal development (ZPD), established a sequential order to the learning process.

**Zone of Proximal Development (ZPD).** According to Vygotsky (1978), the zone of proximal development is “the distance between the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance, or in collaboration with more capable peers” (p. 86). Where Bruner and Piaget focused more on the individual student creating schema from his or her own experiences, Vygotsky focuses more interaction with peers as a means of making meaning. Vygotsky (1978) stressed the importance of teachers understanding where a student needed more guidance and instruction, and then having a peer provide encouragement so that the next time the child will be able to complete the task on his or her own.

**Impact on education.** As part of the zone of proximal development, Vygotsky (1978) suggested teachers use cooperative learning tasks in which skilled learners were paired with those students needing extra assistance. His works have also influenced terms such as
scaffolding and apprenticeship where activities are created by teachers or advanced students so that they less advanced students can complete the tasks with success. This process involves critical such as predicting, clarifying, questioning, and summarizing. However, one drawback to Vygotsky’s work is its reliance on verbal instruction; in contrast, Piaget’s theory relies more on self-discovery of information by the student (McLeod, 2007b). On the positive side, Vygotsky’s concepts coincide with the use of cooperative learning.

**Behaviorism.** Behaviorism was prevalent from the 1920’s to the 1950’s. There are several assumptions associated with the behavioral approach:

- Psychology is viewed as a science.
- Its major concern is observable behavior, not thinking and emotions associated with internal events.
- A person’s environment determines his or her behavior.
- People’s minds are a blank slate when they are born.
- Learning in humans and animals is similar; therefore, research can be carried out in animals.
- Behavior is associated with a stimulus and a response.
- Behavior is learned through the environment. Source: (McLeod, 2007a)

**B. F. Skinner.** B. F. Skinner (1904-1990), an American psychologist, was well-known for his work with behaviorism. He focused more on the study of observable events instead of internal mental events. He stressed the importance of understanding behavior by looking at actions and consequences, and he called this approach operant conditioning (McLeod, 2007). In effect, operant conditioning is behavior that affects the environment (Staddon & Cerutti, 2003).
Though it has many terms and phrases, it is simply habit. One of the concepts of operant conditioning is reinforcement based on a given rule.

*Impact on education.* Skinner also focused on the improvement of teaching in terms of using operant conditioning. He recommended limiting the use of aversive controls or negative reinforcement, specifying educational objectives, and using positive reinforcement repeatedly (Bennett, 1990). His goal was to use programmed learning to supervise learning in proscribed conditions, but that goal never became widespread (p. 26). Skinner’s “Free and Happy Student” (1973) contradicted the student-centered mentality of constructivism. Skinner’s focus on adult-centered education had several key implications for educators today. The first focus is a formal education allows students to learn far more than an education based merely on experience; adults should direct education because it is the adult who knows more about the future. Real-world experiences help with the present, but not necessarily the future; and allowing children to guide their own instruction limits them to only learning about the present (Education Consumers Foundation, 2004). Skinner argues that classroom control should return back to the teacher, but not by use of threat and punishment, but instead by using positive reinforcement to engage the student in behavior that will benefit him or her (p. 2).

*Albert Bandura.* Albert Bandura (1925-), a Canadian-born American psychologist, was the founding father of the social learning theory. The social learning theory deals with how behavior is learned through the process of observations. In essence, children observe how the people around them behave in various ways (Bandura, 1977). He also used the Bobo Doll Studies to observe how children imitate violent behavior they viewed on a video. He concluded that children model behavior (Bandura, Ross, & Ross, 1961). In the social learning theory, there are four parts to modeling: attention, retention, reproduction, and motivation. First, the
individual must pay attention to the features of the modeled behavior. Secondly, the individual must retain the images of the modeled behavior. Reproduction deals with converting symbols into actions. Finally, there must be a motivating factor to imitate the behavior (Bandura, 1971).

**Impact on education.** Bandura’s social learning theory has many implications for students and teachers in today’s schools. First, children imitate people similar to themselves; therefore, they are more likely to imitate children of the same gender. Secondly, people around the child, in this case the teacher, will either provide reinforcement or punishment to the child’s behavior. Finally, children decide what happens to other people before they imitate them, whether a parent, friend, or fictional character (McLeod, 2011).

As a result of his Bobo Doll Studies, schools began to analyze the effect violence in the media has on children’s behavior. Most of the anti-violent programs used in schools today derive from Albert Bandura (Zimmerman & Schunk, n. d.). Through his research on modeling, Bandura also showed educators how children could be taught empathy, sharing, and altruism (Bandura & Rosenthal, 1966).

In terms of the cognitive development of children, Bandura’s view conflicted with the stages and views of psychologists such as Piaget. He claimed that stage development did not account for social learning experiences, motoric competence, and goals and knowledge (Zimmerman & Schunk, n. d.).

**Cognition.** Instead of discussing the anatomy of the brain and other brain basics, the purpose of this section is to address sex differences in the brain and how they relate to the education of the student. The senses are an excellent place to start because it is through the senses that learning takes place. For instance, due to the length of the cochlea in males, their response time to sounds is longer (Don, Ponton, Eggermont, & Masuda, 1993; McFadden, 1998).
 Armed with this knowledge, teachers can infer male student should sit closer to the front of the room. Further research on sex differences of the brain as it relates to the senses revealed the retina of males is thicker than females (James, 2007). The implication of this research would be for teachers to pay close attention to the lighting in the classroom. Opponents of brain research and its impact on education suggest schools have to be careful not to gender stereotype male and female students or hold the belief that the educational implications of brain research apply to all male students or all female students. The theories mentioned give teachers of single-gender classes a blueprint of what works and what does not work in terms of the social, emotional, and academic experiences of the students.

In addition to sex and gender differences in the area of brain function, there are also differences in cognitive processes. In terms of verbal processes, males have been found to possess smaller vocabularies, less memory, and weaker writing skills than females. However, males tend to fare better using analogies. In terms of perceptual speed, males struggle more with proofreading, finding it difficult to find and correct mistakes (James, 2007). In terms of how this knowledge relates to the education of the student, Marshall and Smith (1987) maintained that the traditional instructional practices utilized by most educators reinforces gender differences in learning.

**Brain-based learning.** According to Eric Jensen (n.d.), brain-based learning is simple, “It’s the engagement of strategies based on how our brain works.” He further explains how using brain-based learning in education is actually a necessity when one considers how involved the brain is in what people do and learn. More than anything else, brain-based learning is a way to engage the learner in the educational process. While there are several deviations of brain-based learning, the purpose of brain-based learning in single-gender education is to allow the
student to engage in activities that appeal to his/her type of learning style. There are several examples of how brain-based learning works in a single-gender educational setting. From teaching poetry by turning the classroom into a coffee house to dissecting owl pellets to understand anatomy and physiology, brain-based learning offers educators the chance to questions their own thinking about teaching and learning (Pool, 1997).

Brain research. Brain development in girls, especially ages six to ten, is two years ahead of boys (Sax, 2007). Most single-gender classes are rooted in the thesis that females and males learn differently; therefore, they should be taught differently. Leonard Sax (2001) provides several theoretical frameworks to support the notion of the benefits of single-gender classes, mainly neuroanatomical differences between the genders and differences in learning styles. Driving these frameworks are several known characteristics of the way males and females learn. Females learn better in a quiet classroom with low lighting, with an emphasis on cooperative learning. They are also overly critical of their own school performance, not necessarily compared to other females, but more of a struggle within themselves. Males, on the other hand, thrive in a loud, competitive environment with lots of movement. Just because males and females occupy the same learning space at times does not mean they receive the same educational experience (Pollard, 1999). The most recent research studies adhere to the fact that the size and sequence of different regions of the brain affect the learning of boys compared to girls, not the structure of the brain (Bonomo, 2010). A study conducted by the National Institutes of Health found dramatic differences in brain development of males compared with females, with one example being female brains reaching maturity at 21 or 22 years of age and male brains not reaching maturity until almost 30 years of age (Lenroot et al., 2007). Also, a study conducted by the Harvard Medical School revealed different patterns of brain activation in
the development of males and females (Killgore & Yurgelun-Todd, 2004). With information in hand about the structural and procedural differences between the brains of boys and girls, it is essential for teachers to utilize the research to ensure the success of boys in school.

The brain is involved in everything people do. For example, take experience and how it relates to the brain; experiences mold brains and experiences within the educational setting. Brain-based research takes craft knowledge and turns it into applicable teaching strategies. One aspect of the theory relates to how social conditions influence the brain and how conditions within the classroom can appeal to students’ stimuli. The brain especially responds to sensory stimuli (Colburn, 2009). Social conditions within the school also influence the brain, and that is one reason why the learning arrangement within the school has been at the forefront of research studies exploring solutions to the achievement gap between boys and girls.

**Brain Theory.** Brain-based learning, or educational neuroscience, is a relatively modern theory in the area of education. Designed and developed by various theorists, most notably Eric Jensen (1998) and David Sousa (2006), the theory examines how the brain learns naturally and uses neurological research to provide educational techniques that create effective instruction. The analysis of this theory revealed the left side of the brain is specialized for language, and the right side of the brain is specialized for spatial functions, whether interpreting graphs or more technical information. In terms of how teachers could use this information, Sarah Hileman (2006) suggested several ways to use brain-specific strategies to teach. First, vary instructional activities so that none last more than 15-20 minutes. Secondly, repeat instructions using a variety of methods such as video clips, posters, and cooperative learning. Also, engage students in physical movement activities such as standing to answer, ball-toss games, and cross-lateral movement activities. She also suggests to utilize images such as graphics, pictures, and charts.
since the majority of what is absorbed by the brain is visual. Finally, use new and contrasting experiences to stimulate the brain such as seating and lighting changes; use a variety of colors to present information; and use non-verbal communication by developing a positive attitude, rapport with students, and a safe learning environment.

The Brain Theory concludes that if students’ brains are wired differently, then they should be taught differently (Sax, 2005). The complexity of the male brain and the function of each region has been carefully analyzed by researchers such as Sax (2005) to aid educators in ensuring how information is provided to males correlates with the neurological function of each region of the male brain. Understanding these anatomical differences allows educators to use brain-specific strategies to teach to the gender of their students, and more importantly, teach reading to males in such a way as to engage them while increasing reading achievement in comprehension.

*Theorists.* David Sousa, author of *How the Brain Learns* (2006), offers educators research-based, comprehensive literature that provides information about how the functions and design of the brain may inform educational practices (Darden, 2012). The book helps educators go from theory to practice by giving examples from expert teachers at the end of each chapter. The premise is that once educators understand how the brain the learns, they can effectively develop plans and activities geared to functions of the brain.

Sousa claims the importance of brain research to today’s educational system by touting the advances in neuroscience, the gathering of evidence of cognitive processes of the brain, case studies of people with brain injuries and the rehabilitation process, and highlighting the fact that many of today’s classrooms use practices from the 1960’s (Sousa, 1998). Sousa’s findings have implications for the classroom teacher in terms of the consideration of gender differences. All
educators, whether they are in single-gender classrooms or coeducational classrooms, can use Sousa’s findings by tailoring experiences for students by taking gender into account (Chadwell, 2008).

In 1999, Bussey and Bandura developed a social-cognitive theory of gender development and differentiation (Martin, Ruble, & Szkybalo, 2002). The theory focuses on how behavior specific to each gender is maintained and acquired (Martin, Ruble, & Szkybalo, 2002). Even though there were limitations to the theory, its reliance on including internal and external factors related to the self-efficacy of the child are still used today. Therefore, its rationale for today’s educators is that the whole child should be thought of when determining best fit as it relates to classroom placement. Bussey and Bandura’s (1999) implication of the link between cognition and behavior as it relates to gender are still utilized by proponents of single-gender education.

Researchers. In his book *Boys Adrift*, Leonard Sax (2007) talks about how males are unmotivated and underachieving with a focus on how understanding the male brain can enable teachers to develop methods to meet the needs of the male student. This is part of the reason Sax suggests males and females should not be in classes together. Noting that male and female brains develop differently, other notable researchers point to the fact that males use more spatial and mechanical functioning, less serotonin, more testosterone, and zone out more than females (Janine, 1997). Sax also mentions how medications for males who are diagnosed with Attention Deficit Disorder (ADD) may actually damage areas of the brain devoted to motivation (Hammer, 2009).

Researchers such as Salomone (2013) warn that too much dependence on brain research being tested on animals and the small sample size of human participants is causing opponents to question the effect of brain differences on learning. Neuroscientists now advise educators to
focus on how the brain responds to experience instead (Salomone, 2013). Their belief is that there is a combination of environment, genes, and the brain (Salomone, 2013).

**Theory of Multiple Intelligences.** Yet another theory anchoring the goal of teaching to different learning styles is the Theory of Multiple Intelligences (Gardner, 1983). The theory of Multiple Intelligences focuses on the fact that humans have varying ways of learning and processing information. Howard Gardner (1983) identified eight intelligences that humans use to process information: linguistic, logic-mathematical, musical, spatial, bodily/kinesthetic, interpersonal, intrapersonal, and naturalistic. The theory moves beyond the subject areas of reading, writing, and calculating. Once teachers understand the ways in which students learn, they can develop curricula that better meets the needs of the individual students. Using multiple intelligences as a framework allows educators to develop classroom exercises to reach students’ interests and abilities (James, 2009).

**Strategies.** Once teachers understand which learning style is preferred by males, they can adapt the lesson to meet the needs of those students. With reading being the focus, there are several options in which the material could be presented. For instance, according to OECD (2010b), boys like to read different materials than girls do, such as newspapers and comic books. Hall and Coles (1999) found that boys enjoy reading science fiction, sports-related books, war books, and humorous stories. Reader’s theater, books on tape, and cloze procedure reading are just a few of examples of how to engage males in connecting with the texts mentioned. The key is to find the type of intelligence that will benefit the male student and one that will guarantee success in language arts achievement. In his book *Frames of Mind: The Theory of Multiple Intelligences*, Gardner (1983) asks educators to cultivate and attend to one of the eight multiple intelligences in order to make learning individualized (Park, 1993). Single-gender advocates
have combined the Theory of Multiple Intelligences with brain research to identify strategies to use within the classroom to aid in student engagement.

Theory of Cognitive Gender Differences. The theory of cognitive gender differences relates to the mental functions of males and females. Cahill (2005) suggests the size of areas of the brain, especially the difference in size between males and females, affects the cognitive function. The differences are sometimes the cause of cultural experiences and sometimes the cause of brain function. The main thing to remember is that females are better at some skills, males are better at other skills, and some skills have no noticeable differences. Males are more likely to have deficits in verbal skills, yet they are good at analogies and vocabulary. Also, they function better than females in spatial and mechanical tasks (James, 2007).

Individual differences. Students enter school with individual differences, especially boys and girls, and those differences are enhanced by various learning styles. Brain-based learning allows educators to develop teaching strategies to best meet the needs of each individual learner. Glauco DeVita (2001), speaking to the importance of matching learning styles with teaching styles, stated, “The content, design and presentation of each learning activity should be developed in such a way as to cater to the different thinking and learning styles of students.” In his book Boys Adrift, Sax (2007) suggests that the need for boys to be able to control their environment lends itself to one of the reasons why boys might be disengaged. However, it also provides a reason why there is a disconnect in the classroom in the way teachers teach and males learn. According to Geist and King (2008), the natural learning styles of males must be developed.
Literacy

With males comprising the majority of students who have difficulty with literacy, a closer look at the components of reading and writing are necessary. What is of great importance as well is national and international tests showing females outperforming males in reading and writing (Council of Ministers of Education, 2001; Gambell and Hunter, 2000; Mullis et al., 2003). The results from the national data cause unease among educators in regards to achievement of males in reading (Clark & Douglas, 2011).

According to the National Institute of Child Health and Human Development (2000), the National Reading Panel identified five components to reading - phonological/phonemic awareness, word study/phonics, vocabulary, fluency, and comprehension. All of the components are interrelated, and the purpose is to gain meaning from the text. These components form the foundation of reading, and it is the skills associated with each one that lead to success. Sokal, Katz, Chaszewski, and Wojcik (2007) stress the importance of ensuring students have effective reading instruction in order to become proficient readers and successful students.

Factors that impede success in literacy. An analysis of the factors impeding success in literacy are also necessary to determine ways to negate how they affect literacy achievement. Those factors impeding success include: culture, English language learners (ELL), special education, and socioeconomic status. Culture affects the attitudes students bring to the classroom; ELL students need more practice in phonological awareness (Rosenman & Madelaine, 2012); interventions should be in place to identify potential reading problems in students before they reach the point of special education; and there is a correlation between socioeconomic status and literacy achievement (Payne, 1996). How these factors affect male
literacy achievement will be analyzed to determine strategies to use to close the gap and improve male student success in literacy.

**Culture.** Careful analysis of a student’s culture allows the educator to adjust his or her teaching style to be culturally sensitive to the student. Beaulieu (2002) states, “Instructional practices that address issues of culture and language hold the greatest promise for helping culturally and linguistically diverse learners to become successful readers.” According to Ingalls et al. (2006), the teaching methods of teachers are sometimes culturally insensitive, and this affects student performance in the class. The traditional teaching practices can retard a student’s progress in the class, as well as cause feelings of rejection, anxiety, and isolation. To promote the student’s culture and positively affect student performance, Ingalls et al. suggests teachers understand the learning styles of students, embrace students’ cultural characteristics, become adaptable and change teaching methods in the classroom if necessary, and develop group-oriented classrooms (p. 21). Callins (2006) adds that a teacher who incorporates culturally responsive instruction engage in the following: communicating high expectations, using active teaching methods, facilitating learning, having positive perspectives on parents and families of culturally and linguistically diverse students, demonstrating cultural sensitivity, reshaping the curriculum, providing culturally mediated instruction, promoting student controlled classroom discourse, and including small group instruction and cooperative learning. Teachers who utilize these approaches in single-gender classrooms help motivate and engage students. Research suggests student engagement is the means by which classroom instruction influences student outcomes (Irvin, Meltzer, & Dukes 2007).

**ELL.** The correlation between ELL students and literacy achievement is another area of analysis for teachers of reading and writing. The passage of the *No Child Left Behind Act of*
2001 shone the spotlight on subgroup achievement in the United States. One of the subgroups of interest was ELL students. The classroom teacher is responsible for helping ELL students develop literacy skills, and there are effective strategies to aid in the literacy development of ELL students.

According to Dr. Linda W. Thompson (2004), there are four characteristics of effective language and literacy development teachers can implement into their instruction. Demonstrating high expectations for all students by teaching content and higher-order thinking skills; providing interactive support; using research-based strategies in reading that focus on decoding and phonics skills, vocabulary, and comprehension; and integrating language learning and literacy instruction across the curriculum are all methods of improving the overall literacy development of ELL students (p. 7). As with the culture of the student, engaging ELL students in gaining comprehension is essential to their success in literacy (Li & Edwards, 2010).

Special education. Students with disabilities are not performing as well as students in the general education program, and they are not exhibiting literacy proficiency at the elementary level (Dean, Jr., 2011). Also, males have a greater risk than females of having a learning disability (Flannery, Liederman, Daly, & Schultz, 2000). An analysis of the records of 695 students admitted to special education that was conducted by Wehmeyer and Schwartz (2001) found that males were not necessarily overrepresented in special education, but that females were underrepresented, noting that gender bias was possible. However, that does not change the fact that males still outnumber females in special education two to one (p. 28). There are several reasons for this gap - behavior, biological differences, and gender bias (p. 28). In terms of the implications for single-gender education, higher activity levels of males and behaviors that do
not conform to the traditional classroom setting potentially cause males to be referred to special education than females (p. 31).

**Socioeconomic status.** Many studies have been conducted relating to how the socioeconomic status of the student has an effect on the academic achievement of the student (Baharudin and Luster, 1998; Jeynes, 2002; Eamon, 2005; Majoribanks, 1996; Hochschild, 2003; Seyfried, 1998). Low SES student generally score ten percent lower on NAEP assessments than high SES students (Seyfried, 1998). In a report entitled *Effective Teaching and Support of Students from Low Socioeconomic Status Backgrounds: Practical Advice for Teaching Staff*, Devlin et. al (2012) suggests six practical strategies for the classroom teacher to use that impacts achievement for low SES students. Some of the suggested strategies have implications for teachers in single-gender classrooms. The strategies suggested include: know and respect your students; offer students flexibility, variety, and choice; make expectations clear, using accessible language, scaffold students’ learning; be available and approachable to guide student learning; be a reflective practitioner (p. 3).

**Components of reading.** Reading is the foundation for success in school. Students who are able to read perform better in all other subjects, with skills in reading becoming a necessity for math word problems. Reading is also becoming even more important in an information-driven society (Collins & Collins, 2002). This study is vital to research because not only are males lagging behind females in reading achievement, but adult males’ reading proficiency has fallen, event to the point where only one-third of adult males are reading literature (Gioia, 2006). According to Berndt, Henry, and Lagos (2012), “Literacy achievement is one of the most reliable indicators of educational, social, and economic success.” This is an issue that has a far-reaching effect on the current and future success of society. Boys that improve their reading skills are
more likely to graduate high school, attend college, improve their job prospects as adults, and contribute to the nation’s economy (Penman, 2004). According to Whitmire and Susan (2010), there has never been a more crucial time for boys to improve their reading and writing skills to become college and career ready. This study seeks to analyze the effect of single-gender classrooms on the reading achievement of elementary school males, hoping that with a focus on teaching males reading in a way that appeals to them will improve achievement and overall reading ability of males in general. The idea that males are not successful in school because of behavior, attitude, or gender cannot be accepted; equipping educators with the knowledge that males learn in different ways can impact the structure of the classroom learning environment.

**Written expression.** According to Wendling and Mather (2009), written expression is a combination of cognitive, linguistic, and motor abilities. Written expression is essential for communication; while some may see it as a dying art form, there are others that understand how writing is a way to explain complex material (Stout, 2011). Writing is merely a written expression of thought processes; it is a byproduct of critical thinking and deeper understanding of content (Moore, 1993).

The issue for educators is finding ways to engage males in the writing process, so that they improve essential writing skills. King and Gurian (2006) describe methods teachers can use to engage males in the writing process. Those methods include: increasing experiential and kinesthetic learning opportunities, using spatial-visual representations, letting boys choose topics that appeal to them, making reading and writing purposeful, and offering single-gender learning environments.

Written expression is another area essential to the success of the student in terms of transcending other subjects and allowing the student to become an overall well-rounded student.
Schools are focusing how to engage males in the writing process, trying to appeal more to the interests of males. “Writing encourages students to examine their ideas and reflect on what they have learned. It helps them deepen and extend their understanding” (Burn, 1995, p. 13).

With students progressing through each grade and writing becoming a part of standardized testing, writing expectations have increased. Understanding if there are gender differences in writing skills at the elementary level is essential, especially with the National Commission on Writing (2003) claiming “the quality of writing must be improved” (p. 7). With very little research conducted in the area of elementary male achievement in writing, research in written expression is needed to understand if there are gender differences, and if there are gender differences, what strategies can be used by schools and classrooms to appeal to those differences.

**Six + 1 Traits of Writing.** According to Culham (2003), the 6 + 1 Trait Writing model is writing program that emphasizes teachers using writing instruction that analyzes students writing using a set of characteristics or traits: ideas, organization, voice, word choice, sentence fluency, conventions, and presentation. The ideas and content and the writing piece deal with heart of the message and the details, and the organization correlates with the structure of writing. Voice pertains to how the writer connects to the audience. Word choice determines how the writer paints a picture for the reader. Sentence fluency is associated with word patterns, and the conventions of the program link to the mechanics of the piece (spelling, grammar, and punctuation) (Steineger, 1996). The final piece is presentation, and it pertains to how the writer formats the piece to present it to the reader.

In 1992, Arter, Spandel, Culham, and Pollard (1994) conducted a study that measured the effectiveness of the Six + One Traits of Writing. Six classrooms of fifth grade students was the sample for the study, and a wide range of learning environments was used. Groups were
assigned to either a treatment group or a control group. The treatment group showed significant growth in mean scores of three of the traits taught directly and small to medium growth in the other three traits that were not taught. The control groups showed small growth in all of the traits.

**Components of writing.** Along with reading comprehension, writing skill is a predictor of academic success and essential for an individual to participate in civic life and the global economy (Graham & Perin, 2007). Steve Graham and Dolores Perin (2007) created a report for the Alliance for Excellent Education that identified eleven elements of writing instruction essential for students to learn how to write well and to use writing as a tool for learning - writing strategies, summarization, collaborative writing, specific product goals, word processing, sentence combining, prewriting, inquiry activities, process writing approach, study of models, and writing for content learning. Writing strategies and summarization had the highest effect size in terms of increasing academic achievement and writing skill in students. Surprisingly, grammar instruction was found to have a negative effect on improving students’ writing (p. 21). The implication for teachers of male students is to identify what strategies are being used to teach students writing, and if grammar is prevalent among instruction, it might explain males disengagement from the lesson.

**Single-Gender Education**

A single-gender classroom is one in which the learning environment is identical to a mixed-gender classroom in terms of the curriculum being taught, yet different in terms of class makeup, teaching strategies, and learning styles. From the research, it is becoming evident that many of the institutions entrusted to teach students are not teaching in such a way that appeals to the learning styles of males and females, thus causing males to become disengaged, unmotivated,
and sometimes behavior issues. Furthermore, even though the research does not imply one group is smarter than the other, it does point to the fact there are differences in learning styles (Mead, 2006). The single-gender classroom presents itself as an option for educators to teach to the needs of its students, and also to close the achievement gap between males and females by applying teaching and learning strategies that are gender-specific, and also brain-based. Another caveat of single-gender education is because it is practice, but more importantly it is free (McNeil, 2008). With school budgets tightening across the nation, the implementation of single-gender education is seen as an inexpensive way to improve the achievement of schools. It is also seen as a way to provide males and females with a nurturing, non-threatening environment in which teachers can adapt their teaching methods and modalities to the learning styles of each gender.

**Background.** Single-sex education was the framework of education in America before 1900 (Bracey, 2007). The reasons why were mainly due to the views and expectations of society, as well as the idea of the role of each gender in society (Bradley, n.d.). Males were educated according to expectations related to future occupations, while females were educated for a different purpose, mainly domestic life (p. 2).

During the majority of the 19th Century, single-gender education began to dissipate due to society’s expectations of each gender. With the evolution of equality for women, the purpose of education began to correlate with women’s emergence in the workplace. Society realized it was more beneficial economically for the nation for education cater to both genders (Riordan, 2002).

However, during the 1950’s and early 1960’s, males were favored for academic and extra-curricular activities in facilities that women could not get into (Bradley, n.d.). Single-sex
classes became more common in the late 1960’s and early 1970’s. The purpose of most single-sex classes back then was to separate genders based on physical abilities and characteristics, social functioning, and assumptions by leaders about the interaction between the sexes (Pollard, 1999). However, those purposes are not used today because of laws such as Title IX, which prohibits discrimination on the basis of sex for any educational institution that receives federal money (Hicks, 2009).

In the latter part of the 20th Century, all male institutions, such as the Virginia Military Institute and the Citadel still existed, and their argument for continuing their practices was that female institutions existed (Bradley, n.d.). However, the argument from the opposing viewpoint was that the female institutions that existed did not compare in terms of programs, facilities, and opportunities (p. 2).

In 2001, with the passage of the No Child Left Behind Act (NCLB), schools became more accountable for the success of subgroups on standardized testing. The analysis led to the realization of a growing achievement gap between males and females. With the reauthorization of NCLB in 2006, Title IX was altered to open the door for single-gender education as a form of innovation in terms of closing the achievement gap between males and females. Educational leaders began to investigate the impact single-gender education would have as a means of implementing instructional practices that would impact student achievement (Bradley, n.d.).

**Characteristics.** The structure and purpose of a single-gender classroom is fundamentally different from the traditional classroom. First-time observers of a single-gender classroom may view it as unorganized. However, there are key elements to the single-gender classroom that provide opportunities for students in the single-gender classroom to excel; those elements include structure, connection, and engagement (Chadwell, n.d.).
The structure of a single-gender classroom, especially for males, deals with the way material is presented. Males do better with structure, and there are certain elements of structure, especially in terms of how information is presented, that allow males to excel. First, presenting instructions to males in a bulleted list and giving a step-by-step time frame of completion of assignments is suggested. Secondly, making the suggestion to males to study their notes in the step-by-step manner mentioned above leads to increased achievement. By providing clearer directions and showing students how to prepare for a test, the structure of how material is presented to males is vital (Chadwell, n.d.). In terms of the way the classroom is tailored, Bradley (2010) describes the male classroom as competitive, full of movement, choice for which activities to do, and noisy. The teacher, having been taught single-gender strategies, is able to create a learning environment that is not only fun, but one where learning is taking place.

Females perform better when they are able to make a connection between themselves and the content (Chadwell, n.d.). Making a connection to the content allows females to draw upon experiences. When females are able to make this connection, they are able to give opinions about the content, compare and contrast their experiences to the content, and use manipulative to explore the concepts (Chadwell, n.d.).

Finally, even though the engagement of the student is an expectation in any classroom, the single-gender classroom has a plethora of ways to ensure it happens. First and foremost, educators should tap into the energy that males bring to the classroom; problem-solving questions and project-based learning are two ways to accomplish this. These activities present challenges to males that enable them to take risks and make decisions (Chadwell, 2007). Other options for males include: throwing balls around the room to answer questions, standing to work
or answer questions, setting up centers around the room and allowing for breaks after a lesson (Chadwell, 2007).

**Strategies.** The topic of males and reading achievement has become an urgent issue over the past few years (Connell, 1996). There are several characteristics associated with males and reading: boys generally take longer to show mastery of reading, prefer action stories, prefer non-fiction, and like objectives that are objective and fact-oriented (Gurian & Stevens, 2005). Two of the most specific attributes of gender-specific teaching strategies for teaching reading to males is to make activities student-centered and hands-on. This brings the focus back to the student and what is best for him. Some schools have even had success making sitting optional for male students (Sax, 2007). One of the findings from Margaret Ferrara’s (2005) study of single-gender middle school classrooms was that teachers of males tended to present information faster and in shorter bits of information. Ferrara and Ferrara (2005) also generated a set of instructional tips for gender differentiation, which include utilizing competition and challenges, assigning readings that are fast-paced and quick, engaging in short-term discussion, and preferring reports that are short. Chadwell (2007) also suggests using stations with clear, segmented tasks that have certain time limits for the completion of activities. One of the most fascinating facets of the utilization of specific strategies to improve male achievement in reading is that teachers lend credence to these strategies because they have seen them work (Sax, 2006). Teachers have tried these strategies and realized those that work and those that do not, and they have adjusted the entire organization of how they teach, from the amount of time they spend on certain activities to the amount of verbal instruction they give before assignments. Warrington and Younger (2003) suggested encouraging a wider view of reading, extending provisions of text to include boys’ preferences, creating buddy systems where older boys mentor younger readers, engaging
students in reading journals, and modeling ways for boys to respond to the meaning and content of books. With teachers teaching to the needs of the males, self-concept, empowerment, and achievement improve (Shah & Conchar, 2009).

**Connections.** Students make connections to the text in many ways. This is one area where males and females have similar characteristics in the way they connect to the text and the strategies used by the classroom teacher. In terms of connections for females, they tend to feel more comfortable in an educational setting where they are able to make a connection between themselves and the content (Chadwell, n. d.). Chadwell also suggests activities for teachers to tap into this revelation - allow students to give their opinion about the content; allow students to make comparisons between themselves and the content; use manipulatives to explore the content. Another way to enhance connections in the language arts classroom for females would be to role play and have the students imagine themselves as a character in a book that is being read. Chadwell (2007) also suggests using project-based learning for females, and to integrate classroom lessons with connections to the real world and show relationships between the content and their lives.

One of the key implications of the analysis of connections within the single-gender classroom is the fact that the skills and activities used for females can just as easily be adapted to work for males as well (Chadwell, n. d.). One way to accomplish this would be to use reading material that interests males within the classroom that allows them to connect with the main character. The idea of making connections between the individual and content reverts back to brain-based learning. According to Genesee (2000), “Learning by the brain is about making connections within the brain and between the brain and the outside world.”
Engagement. Males are equipped with the same aptitude as females, but it is their disengagement from school that hinders their academic preparation (Buchmann & DiPrete, 2013). Student engagement is the student’s readiness and desire to participate and be successful in the learning process (Fletcher, n. d.). Why then, are many of today’s students claiming that school is “boring, hectic, stressful and disconnected from the real world” (Dunleavy & Milton, 2009, p. 11)? Is it the student’s fault? Is it the teacher’s fault? Is it society’s fault? In a single-gender classroom, if a teacher is using gender-specific strategies, engagement should not be an issue. Therefore, the question remains, “What can teachers do to engage male students in the learning process?”

Diamond and Hopson’s (1998) research found that a learning environment with no enrichment activities to stimulate the brain actually has a greater impact on the thinning of the brain cortex than an enriched environment has on the thickening of the cortex. One of the first ways to create an enriched learning environment is to use appropriate reading materials and create a responsive learning environment that allows for meaningful discussions. The learning environment should have relevant text that allows the student to make connections between the content and the material. Other ways to engage males in literacy include: engage students in authentic discussions, address students’ cognitive and affective domains, make connections between the real world and education, and create a challenging environment (Tatum, 2006). A study conducted by Brozo, Shiel, and Topping (2007) analyzed findings from three PISA countries in terms of student engagement and reading literacy. The authors suggested using noncontinuous text such as comic books and graphic novels as a means of increasing male engagement in reading (p. 312). This allows educators to use methods that engage students
interactively with the text, thus enabling them to become more motivated, independent, and responsible.

**Teaching styles and strategies.** Finding the right fit between teaching style and learning style is a key ingredient to the success of the male student. When there is a match, more knowledge is acquired, mastery of content increases, and skills are acquired more effectively (Dunn & Dunn, 1978; Hunt, 1972; Lage, Platt, & Treglia, 2000). On the other hand, when teaching styles and learning styles do not correlate, student performance decreases, teacher dissatisfaction increases, and the stress level of the student increases (Pervin, 1980, p.56).

Finding the right fit is generally not practiced when principals are setting up class rosters, where “balance” of the class tends to focus on race and socioeconomic status. When parents are searching for the “perfect” teacher for their child, how beneficial would it be if teaching style was an option? Instead of the student trying to adapt to the teaching style of the classroom teacher, the student would automatically connect with the teacher from day one. When students are comfortable in their learning environment because of the right fit, a more meaningful learning environment is created (Joyce, 1984, p. 34). According to James (2007), in terms of male student achievement, the teacher is the deciding factor. “Boys respond to energy and caring. They want to do well, and it is up to us to give them an environment in which they can learn (James, 2007, p. 247).

Single-gender researcher, Dr. Margaret Ferrara (2009), created a teaching style questionnaire to try to match the teaching style of the teacher to the type of classroom setting (single-gender or mixed-gender). The questionnaire determined the “goodness of fit” of the teacher and the classroom; “goodness of fit” refers to matching teaching styles and learning styles (Ferrara, 2009). Part of the advantage of a single-gender classroom setting is that it allows
the student to become comfortable in his/her learning environment; when the teacher and the student are out of sync, it is difficult for the student to be successful with the type of strategies the teacher is using. Ferrara’s intention is for the research on this subject to arrive at a place where the preferences of the student match the teaching styles of the educator (Ferrara, 2009).

**Direct instruction.** Simply put, direct instruction is where instruction is led by the teacher (Rosenshine, 2008). However, there are several different meanings for direct instruction in terms of how the teacher disperses information; some are positive, and some are negative. Rosenshire lists five differing definitions of the term direct instruction: (1.) Academic instruction that is led by the teacher, and it does not matter if it is quality instruction. (2.) Instructional procedures that were used by effective teachers in research. (3.) The instructional procedures used by teachers to teach cognitive strategies to students. (4.) Instructional procedures used in the Direct Instruction Systems in Arithmetic and Reading programs. (5.) In negative terms, it is where the teacher lecturers and the students sit passively (p. 1). It is the last definition, the one focused on the negative aspects of direct instruction, that has implications for males in single-gender classrooms.

The term direction instruction has a negative connotation among some researchers with terms such as “undesirable teaching,” “authoritarian,” and “passive” (McKeen, 1972; Becher, 1980). When the term is used to describe the teacher lecturing while the student sits passively in his seat, the teacher is not demonstrating effective teaching strategies to engage the student. Gurians and Stevens (2010) describe effective teaching practice that show a direct difference from the negative term for direct instruction: teacher as facilitator providing hands-on, kinesthetic learning, fifty percent of reading and writing choices left up to the students, teachers
move around classroom, students allowed to move around classroom, and teachers use group work and discussion groups. These are boy-friendly activities to improve learning.

**Inquiry learning.** On the opposite spectrum of direct instruction is inquiry-based learning. According to Volkert (2012), “Inquiry based learning is an educational pedagogy, which uses a non-lecture format with the instructor functioning as a facilitator” (p. 15). Inquiry-based learning also engages both the student and the teacher by helping them build analytical, reasoning, and critical thinking skills. Volkert also claims how inquiry-based learning engages the student in becoming an active participant, focuses on group work, discussions, and small-group work.

One example of an inquiry-based learning environment such as Volkert described is the Montessori classroom. The center of a Montessori classroom is the student, not the teacher. The student is the active participant in the classroom, and the teacher is the observer (Torrence, 2012). The teacher in a Montessori classroom is much different than the teacher in the traditional classroom. The teacher moves from a provider of knowledge to a coach, guide, or facilitator (p. 20). In terms of social situations, as problems arise, students in the Montessori classroom work those out logically. Finally, students in the Montessori classroom are given the freedom to make active choices to allow themselves to explore and engage with their work, thus creating an environment where the constructs developed through process and outcomes are the reward (p. 21).

So, what are the implications for teachers of single-gender males in terms of inquiry-based learning? The South Carolina Department of Education (2009) listed instructional practices such as problem-based learning, project-based learning, and inquiry-based learning as recommended components of single-gender programs. It also listed these components as
necessary instructional practices to use to teach males. With inquiry-based learning requiring student engagement, the correlation between the use of inquiry-based learning and teaching males in a single-gender classroom seems to be a perfect match. According to Paulson (n. d.), questions are vital to inquiry-based learning. Furthermore, questions allow the student to connect information the student may already know to information that is relevant and important to him (Caine, Caine, McClintic, & Klimek, 2005). This allows students to see the real-world applications to what they are learning.

**Tolerance for ambiguity.** Another point of interest in the debate is the tolerance for ambiguity of each gender. According to Budner (1962), tolerance for ambiguity deals with three contexts: new situations, complex situations, and contradictory situations. There is little research regarding whether or not one gender teaches or tolerates ambiguity more than the other. The issue could have an effect on student achievement. A study conducted by Fukuchi and Saamoto (2005) found that there is less tolerance among males than females. Furthermore, a study conducted by Erten and Topkaya (2009) suggested males reported discomfort when they did not understand grammar, and ambiguity tolerance is less prevalent among males compared to females. According to Lufkin (2009), it is imperative for educators to monitor the effects of separating the genders, especially when it is viewed by some females as the teacher saying they are not as qualified as males. Furthermore, females sometimes view the amount of praise given to males as discouraging (p. 26). Cheng and Banya (1998) suggest that students who are aware of their learning style and cooperate with their teachers will be effective in matching the preferred learning style of the student and the teaching style of the teacher. Furthermore, Johnson et al. (1995) stressed the importance of modeling tolerance of ambiguity in the classroom to show students how to interact with uncertain situations that occur in everyday life.
They go on to suggest that educators who model an appreciation for ambiguity foster problem solving and risk taking (Derome, Martin, & Kessler, 2003).

**Modalities.** Learning modalities for males refer to the way information is presented to the class. As mentioned earlier, methods of receiving information related to learning modalities for males involves visual, auditory, and kinesthetic activities. According to Thies (1999), there are four learning modalities: visual/verbal, visual/iconic, auditory, and kinesthetic. The visual/verbal uses reading, writing, vocabulary, and spelling activities; the visual/iconic focuses on charts, graphs, and symbols; the auditory uses rhyme, group work, and listening; the kinesthetic deals with hands-on activities. James (2007) suggests using at least three of the four learning modalities when planning instructional lessons for male students. In terms of language arts, James notes that it is much more difficult to develop activities that involve hands-on activities, but easier to plan activities that are verbal (p. 233).

With males not developing verbal skills early and their hearing not as fine tuned as females, the preferred learning style of males is visual/iconic and kinesthetic (Honigsfeld & Dunn, 2003). The teacher can use his or her own judgment to determine which method will help males ascertain the material more easily. James (2007) notes that most tests given to males require verbal skills; therefore, an implication for the teacher of males might be to utilize a performance-based assessment to test for mastery. Finally, James also suggests oral reports for males who are auditory learners, tables and charts for the iconic learner, and role-playing or acting out a scene from a story for the kinesthetic learner (p. 236).

**Best practices.** Best practices in ELA, those that are evaluated and research-proven to be effective, can be utilized to improve achievement in males. In her book *Best Practices for Teaching Reading: What Award-Winning Classroom Teachers Do*, Randi Stone (2008) lists ten
steps educators need to take to improve reading achievement. Activities such as expecting students to make noise, rewarding progress, giving students books they can read, keeping reading fun, allowing for partner reading, engaging students in cooperative learning groups, creating spaces for students to read, ensuring those spaces are comfortable, creating systems and procedures for reading, and allowing students to snack during reading were listed as effective ways to improve the reading achievement in students. The implication of her findings for educators of male students is finding ways to integrate these activities into the single-gender classroom. These activities appeal to males need to move around, take risks, and work with other males during the learning process (Sax, 2007).

Most people agree that the most important thing a child can learn in school is how to read (Kines, 1993). The foundation of reading is a springboard for all other subjects, and its importance for the success in males cannot be overstated. With reading being the strongest indicator of school success (Adams 1990; Hoffert and Sandberg 2001), it is very important that reading instruction fit the needs of the child (Sokal, Katz, Chaszewski, & Wojcik, 2007).

In a presentation to the school board, the Austin Independent School District (2011) notated that while there is not one specific best practice for single-gender instruction, there are multi-faceted approaches that have been found to be effective. Younger and Warrington (2005) grouped the strategies into four different strategies: individual, organizational, pedagogic strategies, and socio-cultural strategies. In terms of individual strategies proven effective for single-gender male classes, mentoring and goal-setting help engage male students. Organizational strategies would encompass single-gender classes in co-ed schools, an all-boys school, and dual academies (p. 15). Pedagogic strategies include topics and subjects that are interesting to males, movement within the classroom, and project-based learning (Gurian,
Henley, & Trueman, 2001). Finally, one socio-cultural strategy proven to be effective is to pair and leaders, mentors, and potential friends with disinterested males (Younger and Warrington, 2005). These strategies have been proven to be highly effective for males of color and males from low-income families (p. 25).

**Differentiation.** According to Tomlinson (2001), differentiated instruction is a teaching theory in which instructional practices vary according to the needs of individual and diverse students. The premise of differentiated instruction is the teacher understanding that students have different strengths and skills, and then the teacher providing instructional practices to ensure every student in the classroom has an opportunity to be successful. James (2007) notes that there are five components to differentiated instruction: qualitative, presentation, product, assessment, and multiple approaches. The qualitative approach deals with observations of student progress. Presentation relates to how the material is presented within the differentiated class. For example, written material, hands-on activities, lecture, and lab exercises allow the student different ways to approach the learning process. Products are simply ways that students demonstrate mastery of the material; examples include graphs, oral reports, games, and puzzles. It is important in a differentiated classroom for assessment to be quick so that students know their progress as soon as possible. Two examples of assessment could be asking questions or writing a paragraph. Multiple approaches are simply using a variety of instructional practices such as debates, reports, writing, and building models (p. 222-223).

James points out that the advantages of differentiated instruction is that it allows the student to stretch their abilities across the curriculum. Therefore, it allows students’ strengths to excel, while also working on their weaknesses (p. 226). Chadwell (2007) suggests that one of the most effective aspects of differentiated instruction in terms of single-gender education is that
a focus on gender differences in a single-gender classroom is an extension of differentiated instruction. Utilization of single-gender education allows teachers to engage students with a focus on differences that benefit the students (Chadwell, 2007).

Multiple intelligences. Gardner’s (1983) concept of intelligence is that students bring different approaches to learning instead of just one. His theory focuses on the fact that intelligence goes beyond reading, writing, and mathematics (James, 2007). Teachers find that using these multiple approaches to learning allows them to better serve the needs of all students.

In terms of the impact the Theory of Multiple Intelligences has on single-gender education, James (2007) states, “The concept of Multiple Intelligences works well with boys because of the emphasis on intelligences other than verbal and quantitative (p. 228). Males do better when material is presented in ways that involve visuals and manipulations and less verbal information. Furthermore, as discussed earlier, males use few emotional words, so asking them to look for details is a much better way to receive input from males (p. 228). James also claims that using Multiple Intelligences is effective for males because it allows them to respond to activities and instructions by using physical activity, drawing, making charts, or demonstrations, thus enabling the teacher to create activities that appeal to an array of interests and abilities (p. 228).

How males learn. Throughout the literature, there is practical advice for teachers to use that translates theories and research of the brain into classroom situations. What is interesting is that many of the assumptions that teachers possess also influence the way they teach their students, and language arts and reading are no different. It is in the area of language arts and reading that many of the teachers teaching males are females; therefore, the way they learned how to read and the literature that they enjoy reading is often different than what engages males
in a love of reading. Therefore, what can teachers do to ensure the way they teach is not only appealing to males, but also has value in achievement? One of the keys for not only teaching in a way that appeals to males but also adds value is to focus on motivation. According to Jenna Cambria and John T. Guthrie (2010), “.... motivation may be stimulated by home and may be influenced by peers, but the teacher is the main factor influencing a student’s development of reading motivation” (p. 16). They also suggest five practices of motivation that teachers could use in their classrooms: success for the student by reading user-friendly text, thematic units to enhance confidence, choice for the student, relevance to connect books to personal experiences, and collaboration and relationship building for motivational and emotional support for the student (p. 21-23). The authors agree the implementation of these practices aids in creating a culture of engagement in the school and in the classroom (p. 29).

In her book *Teaching the Male Brain*, Abigail James (2007) developed a checklist of gender-specific strategies for teachers to use for males when teaching reading. One of the first things that families can do is read to their child every night. While this might seem like a common-sense approach, it is the way the families read to the child that is important. Learning to read left-to-right, the difference between end punctuations, and the imitation of sounds are just a few of James’ (2007) suggestions. The second strategy involves choosing books that appeal to males, which most often involves action. Furthermore, James (2007) suggests developing a culture of readers. This can be accomplished by the implementation of book clubs, most often a father/son activity. If the male is without a father, a mentor can be utilized. According to James (2007), “The point of this being an all-male group is to impress upon the boys that men read, they read on a variety of topics, and they can talk about what they read (p. 200).” In regard to vocabulary involved in reading, James (2007) suggests using word finds, scavenger hunts, word
squares, alphagrams, roots and stems, phonic fun, and replacements. The strategies mentioned reveal a different side of the typical methodology used in American classrooms on a daily basis. Reading becomes active, engaging, cooperative, and most importantly for males, fun. Regarding the impact of single-gender education as a whole on the motivation and achievement of males, Sax (2007) claims, “Single-sex education allows the school to create an alternative culture in which it’s cool to study, in which team competition is for academics is the most natural format imaginable, and in which restoring Kenntnis to its rightful place is likely to yield immediate positive results (p. 187).”

**Debating Single-Gender Education**

There is much debate around single-gender education, with proponents championing the positive effects of single-gender education on increased academic, as well as meeting the academic, social and emotional needs of the child; on the other hand, opponents point to the fact that gender stereotypes are reinforced in single-gender education and others question the constitutionality of a single-gender learning arrangement. Researchers such as Salomone (2013) suggest that the individual student’s growth and development are much more significant than a focus on individual sex differences. She lauds studies that focus on the success of single-gender programs beyond achievement scores.

One thing practitioners on both sides of the issue can agree on is that additional research is needed to prove or disprove single-gender education, research that is scientific-based, appropriately designed, and consistent (Spielhagen, 2008). The hope is that if single-gender education is proven to be a viable option, separating the genders does not become an issue of one gender becoming superior over the other one (Bracey, 2006).
The need for single-gender education. There is a growing epidemic taking place in the United States that has a profound effect on the future of education and society. Male students are lagging behind their female counterparts in the areas of language arts and reading, and the gap seems to be widening (White, 2012). While the research has been mixed on the effects of single-gender education, it is worth analyzing what single-gender schools do that makes them successful. Many school districts have implemented single-gender education as a means of closing the gap; however, there are some that still wonder if there is enough evidence to support single-gender education as the means to close the gap or if there is some other facet of curriculum and instruction that can be analyzed to best produce positive educational outcomes for males in reading and language arts (Ward, 2012). Gurian and Stevens (2005) suggest four components of American education must be closely analyzed to alter the academic achievement of males: learning styles, parental and community roles in educating males, gender-specific teaching strategies, and best practices in the classroom.

With males leading the way among high school dropouts, special education classes, and remedial categories within schools, it stands to reason why there is a spark of interest in why males are underperforming in schools (Legewie & DiPrete, 2012). The Children’s Defense Fund (2009) suggests early childhood development is needed for those students who do not succeed in school because they lack the skills necessary to adapt. This adds to the achievement gap between males and females. The area in which the achievement gap is widening between males and females is language arts, especially reading achievement. Males struggle in reading no matter the race or income of the parents (Biddle, 2010). Why are males lagging behind? Could it be that the way males are being taught ELA is causing them to become disengaged in school, due to the fact the teaching force is 71% female (US. Census Bureau, 2004)? Is it motivational,
behavioral? It could simply be a matter of the organization and structure of the school. Are schools set up in such a way that they appeal more to females than males? According to Rivers and Barnett (2012), the idea of a single-gender classrooms to help close the achievement gap in scores in math and science as well as the desire for a career in engineering and technology may actually backfire due to teachers behaving differently towards boys than girls. However, there are several ideologies that suggest causes for the divide - approaches to learning, cognitive development, attitudes, and teacher characteristics (Dee, 2005). It is this widening gap that has led school districts to alter the learning arrangement of males. The learning arrangement, or type of classroom, offers males an alternative to the traditional coeducational setting. There are two types of learning arrangements in the classrooms of schools today. There are single-gender classrooms and coeducational classrooms and several models of teaching such as team teaching, co-teaching, and flipped classrooms. However, the focus of this study is on the impact of the single-gender classroom on the language arts and reading achievement of males in elementary schools.

Proponents of single-gender education. Author and single-gender proponent Leonard Sax (2005) points to the gender gap in subject areas over the past thirty years as evidence for the need for single-gender education. In terms of academic success and single-gender education, motivation and engagement are often terms used to describe why students experience academic success in single-gender classrooms, males especially. Males want to come to school, are willing to take risks, and are open to making mistakes (Steeves, 2012).

In addition to the academic success concerning single-gender education, proponents also point to single-gender education as a means of meeting the social and emotional needs of the child. Chadwell (n.d.) claims the structure of the classroom in single-gender settings and the
building of a classroom community of learners are key to meeting the social and emotional needs of males. Furthermore, there are proponents that claim single-gender education creates a well-rounded educational experience for boys, especially where teachers adapt their teaching styles to meet the needs of boys (Mullins, 2009).

According to McTaggart (2009), “Experience suggests boys and girls learn differently, and research verifies it.” Proponents of single-gender education cite the fact that males and girls are wired differently as a means for implementing single-gender education. In addition to the differences in the brain structure and function of male and female brains, proponents cite the need for single-gender education as a way to close the achievement gap between males and females (Hamilton, 1985; Durost, 1996; Dean, 1998; Shapka and Keating, 2003; Gurain, Stevens, & King, 2008). According to Geist and King (2008), “To support excellence in both boys and girls, we must design experiences and curriculum that meet the needs of both . . . by understanding their uniqueness” (p. 50).

**Opponents of single-gender education.** On the opposite end of the spectrum, opponents of single-gender education suggest that gender stereotypes are reinforced from single-gender education, while others question the legality of even creating an educational arrangement that separates males and females (Friend, 2007). Several studies show that using gender-specific curricula and gender-specific teaching strategies simply reinforces gender bias, which leads to gender stereotypes (Lee, Marks, and Byrd 1994; Sadker and Zittleman 2005).

Another issue raised about single-gender education is the counter-effect it might actually have on the achievement of students. For instance, instead of strengthening the methods used to teach males and females, single-gender education sometimes highlights the differences (Zubrzycki, 2012). Schools could become places where the learning styles of males and females
are exacerbated instead of finding ways for each student's style to complement the other. Salomone (2000) noted single-gender education must be monitored closely to prevent a return to a society where gender disparity exists within schools, and females are streamlined into potential careers with less advancement than males.

Rigdon (2008) points to several concerns regarding single-gender education, such as not preparing students for a society that is mixed-gender and programs that supply insufficient funds to one gender or the other. She also claims that any research used to support single-gender education is derived from proponents of single-gender education, is unreliable, lacks adequate controls, and uses samples that are self-selected (p. 533). Others worry it goes away from equal access to education, constitutes a huge step backward, takes away the opportunity for males and females to work together, creates a dual-educational system, and gives the impression to each gender that they are not capable of getting along with the other gender (Vail, 2002).

**Stakeholder Roles.** Parents, community, teachers, and leaders all have a role in single-gender education. First, the role of the parents cannot be overstated; simply stated, parental involvement has a direct correlation with student success (Hill et al., 2004; Hortacsu, 1995). Secondly, in terms of community and teachers, James (2007) states it is imperative that teachers, especially if they do not share the same heritage as their students, take the initiative to become a part of the community to ensure open lines of communication between the teacher, the students, and the family.

A survey conducted in South Carolina, the state with the most single-gender classrooms, showed that single-gender education was well received by key stakeholders (Chadwell, 2008). The survey noted that self-confidence, independence, participation, and desire to succeed all increased as part of being in a single-gender education program. An analysis of the survey
indicated the key stakeholders believed the single-gender education program helped meet the diverse needs of all students (p. 1).

**Parents and Community.** Another finding suggests the role of the parents and the community plays a role in the achievement of males, especially minority males (Walton, 2010). While there is a give-and-take mentality among parents and educators, where one group holds the other accountable for the success of the child, research suggests parental involvement plays a vital role in the academic achievement of the child (Lawrence, 1995). When there is a partnership among parents, teachers, students, and people in the community, the end result is success for the child.

King and Gurian (2006) suggest two other ways for parents and the community to aid in the education of males. They stress the importance of parents becoming involved in not only checking over homework, but that schools who offer single-gender education to hold parents accountable by having them sign the homework (p. 57). Furthermore, there are examples of schools such as Douglass Elementary School in Boulder, Colorado, that ask for the community’s help and support by soliciting male role models to discuss their love of literacy (p. 58).

A study conducted by the Department for Children, Schools, and Families in 2008 revealed key findings that are relevant to the importance of parental and community involvement in educating males. First, the study found that male achievement in all subjects is heavily influenced by parental involvement and family relationships (p. 5). Also, when there was a joint partnership between the child and the family in learning, there was marked improvement in literacy skills (p. 7). Finally, when reading as a family took place in the home higher scores in pre-reading and language were reported, alphabet learning increased, and trips to the library increased (p. 7).
Teachers. According to James (2007), “As a teacher of boys, I have found that the single most important thing that they need is a teacher who can understand them” (p. 166). Not only does she describe the importance of listening, but to truly understand and read what male students are trying to express. An expert teacher will be able to perceive when a male student is struggling and then make necessary adjustments to ensure all students understand the material.

Another vital aspect of the role of teachers in single-gender education is the lack of teachers with similar backgrounds as the students. Hubbard and Datnow (2005) suggest teachers can still be effective with students from diverse backgrounds by showing interest in the student and spending time with him.

Teachers of male single-gender classes have to understand that the behavior of some males may not fit into the traditional form of behavior expected in the classroom (James, 2007). Some of the issues that may arise might be due to a student’s culture, not an act of misbehavior. This will require teachers to examine their beliefs about students (p. 168). In terms of male students, James suggests that teachers have to remember to apply principles and strategies of single-gender education to all boys, regardless of race or socioeconomic status (p. 168).

Legal Issues Surrounding Single-Gender Education

The American Civil Liberties Union (ACLU) has spearheaded the effort to question the legality of single-gender education. Their goal is to put an end to single-gender education due to its use of unproven science and its reinforcement of gender stereotypes. They have sent cease and desist letters to several states, as well as the filing of public records to review single-gender practices of states engaged in single-gender education. The ACLU notes how single-gender education prevents males and females from receiving equal educational opportunities, noting the Equal Protection Clause of 1972, thus questioning the constitutionality of single-gender
education. The ACLU is insistent that the goal of any educational setting is to teach students, not stereotypes (Robbins, 2012).

There is also growing concern that the segregation of the sexes contradicts an egalitarian society (Strauss, 2012). Segregating males and females in classes reverts schools back to the days of when classes were segregated based on color. According to Hubbard and Datnow (2005), “Some analysts assert that gender-based separation constitutes a return to structured inequality, an especially troublesome possibility when single-sex programs target students of particular racial and ethnic groups.” Furthermore, feminists, black educators, and civil libertarians fear that single-gender education strays from equality and even discredits the notion of “separate but equal” (Scott, 1994).

**Cases.** Two landmark cases involving single-gender education were the United States v. Virginia and the Mississippi University for Women v. Hogan. In both cases, the United States Supreme Court found both schools’ enrollment policies unconstitutional. The Court addressed the general issue of single-gender education in both cases. The court noted in both cases that the establishment of single-sex educational institutions requires an “exceedingly persuasive justification” (Brake, 1999). However, both court cases did leave the door open in terms of being able to establish single-gender programs as long as there is a goal of rectifying past or present discrimination (Brake, 1999).

**United States v. Virginia.** One of the landmark cases that had an impact on single-gender education is United States v. Virginia (VMI). Using the Equal Protection Clause as its justification, the court ruled that the Virginia Military Institute had to admit women to its program (Eason, 1997). The ruling set a precedent that any educational setting that excludes a particular gender would be met with scrutiny under the Constitution (Brake, 1999). However, it
does not foreclose the implementation of single-gender education, and according to Brake (1999), “The law thus recognizes that there are circumstances in which properly designed and implemented single-sex education can play an important role in combating discrimination and dissipating traditional gender classifications.”

The implications from the case in regard to single-gender education are far reaching. First, the decision did not clarify how this ruling affected single-gender education specifically. However, the initial reaction was the ruling would be the end of any forms of single-gender education. One facet of the decision is that the door was left open to future single-gender settings by inferring it would be permissible as long as both male and female single-gender schools were provided for equitably. The decision rendered implied that as long as the curriculum was not too different, schools could afford delivery of instruction in a manner different than what is common in most educational settings (Land, 1997). Furthermore, in terms of the uniqueness of the educational setting, the ruling opened the door for the justification of single-gender education in remedying barriers that might limit the educational opportunities of one gender compared to another (Brake, 1997).

**Mississippi University for Women v. Hogan.** The first court case to deal directly with single-gender education involved the Mississippi University for Women and its refusal to admit males to its school of nursing. In June of 1982, the Supreme Court handled its first case involving single-gender education and ruled that the school’s refusal to admit males was unconstitutional. The decision was seen at the time as the final nail in the desegregation of single-sex schools and posed the potential for any future cases involving single-gender education as unconstitutional on the basis of “illegal classification” based on sex (Wheeler, 1983).
While the *Mississippi University for Women v. Hogan* case was used as a precedent in the *United States v. Virginia* case, it was difficult to apply any of the conclusions to present-day single-gender schools and single-gender classrooms. One of the reasons is that single-gender classes usually benefit both genders, not preventing a particular gender from participating. Lastly, the purpose of many current single-gender settings is simply to be innovative, not to make up for past discrimination (Fortney, 2004). The overall goal of the Court in the case of *Mississippi University for Women v. Hogan* was to prevent gender stereotyping in terms of professional tracks for males and females (Brake, 1997).

**The Constitution and Single-gender Education.** In addition to gender bias and gender stereotyping, opponents of single-gender education also point to the constitutionality of single-gender education in terms of separating males and females in the classroom. The Equal Protection Clause of the Fourteenth Amendment of the United States Constitution, is sometimes used as justification for not supporting single-gender education (Milon, 2007). Opponents suggest implementing single-gender education negatively singles out one group by treating them differently (Milon, 2007).

With the decision in *Brown v. Board of Education*, the Supreme Court recognized, “Education is perhaps the most important function of state and local governments (Fortney, 2004, p. 857). It is this statement that opens the door to question alternative methods to education such as single-gender education. There are some who raise questions about whether or not single-gender education should even be a constitutional issue. After all, single-gender institutions have been around a long time; they were institutions that prepared males or females for their future role in society. However, what is becoming clear is that these institutions aided the proverbial role of each gender in society (Whittemore, 1994).
Title IX and Single-gender Education. Besides using the terminology of the Equal Protection Clause, opponents also use Title IX as a means for denouncing single-gender education. Title IX of the Educational Amendments of 1972, prohibits discrimination on the basis of sex for any educational institution that receives federal money (Hicks, 2009). Using Title IX as its basis, opponents of single-gender education stress that co-educational classes must be offered as an option in any school or institution offering single-gender education (Robbins, 2012). Under an amendment to Title IX, states are allowed to implement single-gender education, but they must provide justification that is persuasive enough to use single-gender education as a way to provide “innovative” methods for closing the achievement gap (Mead, 2003). However, schools must follow certain guidelines to be able to provide single-gender education. First, a rationale must be provided for implementing single-gender education. Secondly, a co-educational class must be provided as an alternative. Finally, a review must be conducted every two years to ensure there is still a need for single-gender education. However, the American Civil Liberties Union and the Office for Civil Rights have an issue with some schools forcing students into single-gender classrooms under the premise that it is in the best of interest of meeting the child’s educational needs (Downey, 2012).

Research on the Achievement Gap between Males and Females

Citing a need to decrease the gender divide in education, proponents for single-gender classes understand the influence of single-gender research on improving the test scores of males, as well as developing more well-rounded individuals (Stables, 1990). With males entering kindergarten already behind females in verbal/literacy skills, the achievement gap grows as the curriculum becomes favored toward females (Sax, 2005). The disparity between males and females in reading achievement is a growing concern worldwide. Females had higher
achievement than males in every Programme for International Student Assessment (PISA) country (OECD, 2010a). It was not until the enactment of the No Child Left Behind Act of 2001 that scores showing the gap between males and females in reading achievement became a concern as results for these sub-groups were part of the accountability aspect of the law. With males being more often identified as struggling readers than females, the achievement gap in language arts continues to grow (Chiu & McBride-Chang, 2006). Girls have even caught up with boys in math and science classes, and boys continue to trail girls in reading and writing in every demographic (Tyre, 2013). According to the National Center for Education Statistics (2000), on the National Assessment of Educational Progress in the year 2000, males lagged behind females by one-and-half years in reading/writing. The No Child Left Behind Law of 2001 brought to the forefront the data and the country realized the importance of closing this gap, and giving educators the leeway to use alternative methods to close the gap. Practical applications, such as the use of a single-gender learning environment, are just one of the ways educators have attempted to address the issue in the last decade. It has also been shown that females are more competent in spelling and perform better in literacy and writing (National Center for Education Statistics, 2003). As long as the National Assessment of Educational Progress has been administered, females have outperformed males in reading (Mead, 2006). Males have also made less progress than females in reading achievement according to average test scores (Center on Educational Policy, 2010). Females enter kindergarten more ready than males to become involved in a verbal-rich curriculum (Whitmire & Susan, 2010). It is evident that one of the most pressing issues facing educators in the 21st Century is the gender gap in reading achievement, and it is vital for researchers and policy makers to investigate how the learning environment might be changed to address the needs of males (CEP, 2010). Table 1 shows the
achievement gap between males and females on the National Assessment for Education Progress (NAEP), which clearly shows the success of females in reading achievement and males in math achievement (Cited by Whitmire & Susan, 2010).
Table 1

The Gender Test-Score Gap

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Boys Standard Deviation (Math)</th>
<th>Girls Standard Deviation (Reading)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nine Year Olds</td>
<td>.02</td>
<td>.19</td>
</tr>
<tr>
<td>Ten Year Olds</td>
<td>.12</td>
<td>.21</td>
</tr>
<tr>
<td>Seventeen Year Olds</td>
<td>.18</td>
<td>.24</td>
</tr>
</tbody>
</table>

Note. The table represents how girls do better in reading, and boys do better in math according to the 2008 NAEP Long-Term Trend.

The scores of males are actually better today than they were twenty years ago. What is different is the gap has widened as males progress through school. Furthermore, it is not just low-income students, or Hispanics, or African American males that are lagging behind as some believe (Sax, 2007). According to Sax (2007) in his book *Boys Adrift*, “The reading and writing scores of fourth-grade American boys have improved somewhat, which has actually narrowed the gender gap separating them from girls. But during the same period of time, the reading and writing scores of twelfth-grade American boys have dropped. The gender gap separating twelfth-grade girls from twelfth grade boys has widened, not because girls are doing better – they’re not – but because boys are doing worse (p. 36).”

The whole point of understanding the reason behind the achievement gap is to maximize the potential of all students. When looking at the achievement gap, the goal is ensure schools and school districts throughout the country are doing what is best for students. According to Kathy Christie (2002), “... closing the gap is not about holding others back (p. 103). She understands analysis of the achievement gap forces schools to seek interventions to increase academic achievement. The *NCLB Act of 2001* took analysis of the achievement gap to another
level by holding schools accountable for closing the achievement gap between males and females.

**Diversity and Low-Income Students**

In addition to an achievement gap between males and females, there is also a gap among males from underrepresented populations and white males. According to the National Center for Education Statistics (2009, 2011), African American and Hispanic males trailed white males by more than 20 points on the NAEP reading assessment in 4th grade and 8th grade. One of the reasons for the gap seems to be motivation (Katz, 1967). As minorities continue to experience failure in school, black students still have low expectations, perceive themselves as incompetent, and perceive their poor academic achievement as low ability or factors beyond their control (Graham, Taylor, & Hudley, 1998). Furthermore, according to DiMaria (2008), Latinos experience much of the same shortcomings as their male counterparts when it comes to educational success; there seems to be a mismatch between the teaching style and the learning style. In 1997, then-governor of California, Pete Wilson, initiated single-gender academies as a vehicle to improve the achievement of low-income and minority students. However, a two-year ethnographic study of the academies revealed that it takes more than a change in classroom arrangement to increase achievement of low-income and minority students (Hubbard & Datnow, 2005). The *No Child Left Behind Act of 2001* brought the issue to the forefront by urging schools to find ways to close the achievement gap for underachievers from disadvantaged backgrounds by ensuring they become proficient in the area of language arts (Konstantopoulos, 2009).

There are several studies that point to the positive effects of single-gender education on the achievement of minority and low-income students. Riordan’s (1994) study that synthesized
several studies found that there are positive effects for minority boys. In a 1997 roundtable discussion of the positive effects for minority and low-income students, Riordan stated:

The academic and developmental consequences of attending one type of school versus another type of school are virtually zero for middle-class and otherwise advantaged students; by contrast, the consequences are significant for students who are or have been historically or traditionally disadvantaged minorities, low- and working-class youth, and females (so long as the females are not affluent) (Riordan, 1998, p. 53).

Hudley’s (1995) assessment of the impact of separate schooling for African American males revealed that when they were placed in an environment based on goodness of fit, they thought of themselves as more academically competent. However, even though these studies suggested positive experiences when students were placed in single-gender settings, there is still opposition to the idea that the separation of the genders increases students achievement.

*No Child Left Behind Act of 2001*

The *No Child Left Behind Act of 2001* is federal legislation that enacted the theories standards-based education reform. One of the main characteristics of the *No Child Left Behind Act of 2001* was the desire to improve student achievement and to hold states and schools accountable, especially in the achievement of subgroups. Careful analysis of the subgroups revealed an achievement gap between males and females. The academic progress of the school’s demographics would be evaluated on an annual basis. *No Child Left Behind* (2001) authorized school districts to use local funds to begin single-sex classrooms or schools, as long as they were in compliance with Title IX. In 2006, the U.S. Department of Education altered the Title IX regulations to make it permissible to broaden the implementation of single-gender classrooms in elementary and secondary schools. States must still provide a rationale, offer coeducational
classes, and review the program every two years (Meyer, 2008). Due to the influence of the
*NCLB Act of 2001*, a focus on the academic achievement of the genders would be highlighted
among other categories, such as race, socioeconomic status, and subgroups such as English
Language Learners and students with Individualized Education Plans. Once the scores of these
subgroups became known, it was evident that there was a gender gap, especially in the area of
reading achievement. Careful analysis of the data helped create the rise of single-gender
education, with a focus on targeting a type of classroom that would meet the individual needs of
males and females based on their learning styles (National Association of Single-Sex Public
Education, n.d.). Where there were only a few schools offering single-gender classes in the early
90’s, now there are over five hundred schools offering some type of single-gender education
(Ward, 2012).

Realizing that a one-size-fits-all approach has not been working, the *No Child Left
Behind Act of 2001* enabled schools and school districts to offer a broader instructional set of
choices to its students. It gave schools and school districts legal options to promote student
achievement, especially in researching innovative ways for school improvement (Friend, 2007).
According to Jim Rex and David Chadwell (2009), “Single-gender classes need not replace
ongoing instructional strategies, but they can be a catalyst for engaging students by altering the
structure of classes and student dynamics (p. 29).” One of the outcomes of the single-sex
classroom is the engagement of the student, most importantly in the male student, the desire to
want to learn because of the way the material is presented.

Yet another outcome of *NCLB* (2001) is its expectation that ALL students will be
proficient or advanced in language arts and math. The goal is for all students to reach this
milestone by the year 2014. Analysis of data revealed the discrepancy between males and
females in the area of language arts and reading, and the passage of the law allowed states to use funds for “Innovative Programs” to support single-gender classrooms and schools (Novotney, 2011). It is within these schools and classrooms that educators hope to close a language processing gap in which language areas of the brain in 5-year-old boys looks similar to that of 3-year-old girls (Novotney, 2011). Working with students’ interests, motivations, and preferences in mind can spark the awareness of a well-qualified teacher to teach reading to males that is atypical.

**Single-Gender Classroom Studies**

Even though research studies are sparse in the United States, several international studies have proven beneficial to the research of the effect of single-gender education on student achievement. LePore and Warren (1997), using a longitudinal study, found that that boys in single-sex schools did not improve their test scores more than boys in coeducational schools (Haag, 2000). The studies that have proven to be positive are those that involve single-sex schools, not single-sex classes (Haag, 2000). Riordan (1990), in his study of the effects of single-sex education on different populations and curricular areas, discovered African American and Hispanic American males and females scored higher on standardized cognitive tests than similar students in coeducational schools. Mulholland, Hansen, and Kaminski (2004) monitored a school-based initiative that was formed to address the underachievement of males. Results were taken before and after the initiative. While there was no significant difference in math achievement between students in the single-gender classes and the coeducational classes, scores in school-based English did improve for those students in single-gender classes. Lee and Bryk (1986) studied and compared the effects of single-sex schooling and coeducational schools over twenty-five years ago, and their findings revealed that a deeper look into the positive effects of
single-sex education is warranted. However, according to a research review conducted by the American Institutes for Research in 2005 based on ten years worth of evidence from the most reliable single-gender studies, only one-third of the studies favored single-gender education and its effect on the academic achievement of students (Meyer, 2008). What is not clear is exactly what single-sex schools in those studies that did show positive effects on academic achievement of males are doing differently than coeducational classrooms so that those strategies, policies, and methods in single-sex schools could be replicated in single-sex classrooms.

One study showing positive effects in terms of utilizing data-driven instruction was a study conducted at Stetson University in Florida (NASSPE, n.d.). Their studies showed males made greater improvement in all male classes than females did in all female classes. The three-year study compared single-gender classes and mixed-gender classes with matched variables. The findings cited the fact that males had an 86% proficiency level in single-gender classes compared to 37% in mixed-gender classes. One significant aspect of the findings is that the males who scored at the 86th percentile in the single-gender classes had been labeled as special needs or ADHD in mixed-gender classes.

There are several studies that haven’t shown significance in terms of achievement single-gender classes. Singh, Vaught, and Mitchell (1998) compared two single-sex classes and two coeducational classes in an inner city. While the class grades were higher in the single-sex classes, they were not statistically significant. Sanders and Reed (1995) conducted a study of black boys enrolled in a cultural immersion school, and the study found the black boys were more responsible for their own intellectual and academic achievement; however, this did not lead to higher academic achievement. Also, Hudley (1995, 1997) analyzed potential effects on the academic self-concept of black males enrolled in separate Afrocentric classrooms; however,
there were little effects on achievement. Other opponents of the effect of single-gender education on academic achievement state the importance and the ability of highly-qualified teachers to differentiate instruction to any type of classroom setting, thus meaning a single-gender classroom is not necessary for that to happen (McNeil, 2008).

Lea Hubbard and Amanda Datnow (2005) conducted an ethnographic study of low-income and minority students to analyze the effects of a single-gender setting on educational outcomes of the students. While their intention was to observe whether or not single-gender education had a positive effect on the achievement of low-income and minority students, they found out that the success of the students had more to do with support for students, resources, and positive student/teacher relationships. However, they did find evidence to support the fact that schools can provide ways to meet the needs of the students, even if it is sections of the day devoted to single-gender education. According to Hubbard and Datnow (2005) this would recognize that sometimes, “....school boundaries blur with the realities of life (p. 128).”

The studies that do show positive achievement effects are relegated to those with certain contexts and group characteristics (Haag, 2000). What is shown is that there is research left to be done that identifies specific area indicators that prove single-sex education is better than coeducational schools. What are the characteristics, principles, values, and beliefs evident in successful single-gender schools that can be transferred to coeducational schools with single-gender classrooms? Haag (2000) does identify several characteristics of single-sex studies that should be taken into account when discussing the effect of single-sex education on educational achievement: (1) the goals of the stakeholders involved, (2) which indicators of success are used, (3) the historical context, (4) and the issue of selection bias due to the fact that many of the single-sex schools in the United States are privatized.
What is known is that studies on the effects of single-gender classes on male achievement are in short supply, especially in the United States and also in public education. Detractors also point to the fact that most of the students in single-gender classes and schools opt-in to the single-gender setting (Zubrzycki, 2012). Studies show the effects on female achievement, the achievement gap between males and females, how self-esteem is affected by single-sex education, the attitudes of students toward single-sex education, achievement in single-sex schools, the effects of single-sex classes in high school, and strategies used to meet the needs of male and female students.

One of the fears raised in many of the studies is that single-sex schooling would do more harm than good to gender stereotyping in school (Thiers, 2006). After all, not all males can be generalized by the characteristics mentioned by several of the proponents of single-gender education. Others note that single-sex schooling is a step in the wrong direction, especially when equality is an educational buzzword over the past few years (LePore and Warren, 1997). A six-year study by the American Association of University Women Educational Foundation revealed several key points. First, there was no evidence that single-sex education works or is better than coeducational schools. Secondly, educators need to determine what constitutes a good education; some students in some settings are successful in single-sex education, but it is not known if it is the environment or the teacher that makes the student successful. Finally, the long-term impact of single-sex education is relatively unknown. The long-term effects of single-gender education is the quandary for researchers and educators.

**Summary**

Even though there has been a growing focus on the achievement of males compared to females, the gender gap remains. Furthermore, even though the gap seems to be stabilizing, the
area of achievement in literacy for males has not improved compared to females (Booth, Elliott-Johns, & Bruce, 2009). There is still a need to find out what specific methods and strategies are working so well in single-sex schools and see if they can be replicated in single-sex classrooms. With a focus not so much in teaching reading, but rather revealing to males how to become successful readers, educators need to encourage males and build confidence (Younger and Warrington, 2005). The issue is vital because reading is fundamental to all other areas of discipline, and improving this area of achievement in males is crucial to society. Every day in classrooms all throughout the country and the world, males are sitting in classes with the odds against them. As a result, males sitting in many classrooms today are simply bored, which leads to behavior issues. It is essential for educators to determine the reason why males lag behind females in Language Arts achievement, and to look closely at what male students are doing in the classroom to see if they are taking a different approach to learning (James, 2007). Even if single-gender education is not the solution, a focus on why males are slipping through the cracks should be emphasized in schools.

Closing the educational gap between males and females has been at the forefront of the educational arena, and studies related to the effect of the type of learning arrangement (single-gender vs. coeducational) on achievement are vital in equipping educators with the necessary tools to narrow the gap. It is even more crucial now due to the accountability requirements of the *No Child Left Behind Law of 2001*. The hope is that a common element can be found in the study of single-gender education for males to become successful in the area of Language Arts. While single-gender education is not the magic bullet to fix the gender gap in Language Arts, it is worth researching to distinguish its impact on student engagement and differentiation in the teaching and learning of males. With research supporting the positive effects of single-gender
education in private and church schools, more substantial research is needed to prove its effectiveness in the public school setting.
CHAPTER THREE: METHODOLOGY

The purpose of this study is to compare how males who are in a single gender classroom in grades three, four, and five score on their Mississippi Curriculum Test, Version 2 (MCT2) Language Arts scores as compared to males in the mixed gender classrooms (grades three, four, and five). The study will be conducted with a sample of students from both classroom arrangement settings at an urban elementary school in the northeastern part of the state. According to Strain (2013), minimal empirical data exist, especially in the United States, regarding student outcomes in different types of classroom settings (single-gender vs. mixed-gender). The study aims to shed light on the impact single-gender education has on the educational outcomes in Language Arts of students in grades three, four, and five. The research design, questions and hypotheses, participants, setting, instrumentation, procedures, and data analysis are described.

Research Design

A causal comparative, or *ex post facto*, design will be employed to compare the performance of male students in grades three, four, and five on MCT2 Language Arts scale scores. This retrospective study will analyze data gathered during the 2011-2012 school year. This is a causal-comparative design because the cause and effect had already occurred and are being examined after the fact (Gay, Mills, & Airasian, 2011). M. Gall, J. Gall, & Borg (2007) note a causal-comparative design is one that seeks to describe a cause-and-effect relationship using an independent variable and a dependent variable. This design is appropriate for this study because the researcher seeks to describe and synthesize data while analyzing the relationship between the variables of the type of classroom and student achievement in reading and writing. Also, the researcher has little to no control over the independent variables, and the researcher
could not randomly choose the participants or the class to which they were assigned (Glatthorn & Joyner, 2005). The study uses an *ex post facto* design instead of a correlational design for two reasons. First, the groups already existed, and the data for the study has already been gathered. Secondly, correlational research focuses on one group and two variables, whereas an *ex post facto* design focuses on two or more groups and one variable (Gall et al., 2007) (Ary, Jacob, & Sorenson, 2010). The sampling procedure used is convenience sampling, or cluster (class) sampling. The participants of the study differ on an independent variable level (the cause), and careful analysis using both descriptive and inferential statistics will be used to determine the consequences (the effect) of each independent variable. The results will report the scale scores of each group, males in single-gender classes and males in mixed-gender classes, over the course of one year. In this way one may conduct statistical analysis looking at difference in means (*t* test). Therefore, including descriptive characteristics is appropriate for this study. The primary variable of interest is the MCT2 Language Arts scale scores of elementary male students in grades three, four, and five. The independent variables are the type of classroom in which the male students were enrolled – that is, a single-gender or mixed-gender classroom. The proposed study consists of two independent variables and one dependent variable. The independent variables are the single-gender classrooms and the mixed-gender classrooms. The dependent variable is the MCT2 Language Arts scale scores for males in grades three, four, and five.

**Questions and Hypotheses**

The research questions and the null hypotheses addressed in the study are the following:
**RQ1.** Does the type of classroom (single gender vs. mixed gender) have an impact on grades three, four, and five male students’ Mississippi Curriculum Test, Version 2 (MCT2) scale scores in Language Arts?

**Null Hypothesis 1-1.** There is no significant difference in third grade male students’ MCT2 scale scores in Language Arts in single gender classrooms as compared to a mixed gender classroom.

**Null Hypothesis 1-2.** There is no significant difference in fourth grade male students’ MCT2 scale scores in Language Arts in single gender classrooms as compared to a mixed gender classroom.

**Null Hypothesis 1-3.** There is no significant difference in fifth grade male students’ MCT2 scale scores in Language Arts in single gender classrooms as compared to a mixed gender classroom.

**RQ2.** Does the type of classroom (single gender vs. mixed gender) have an impact on grades three, four, and five male students’ Mississippi Curriculum Test, Version 2 (MCT2) percentage of questions answered correctly in vocabulary, reading comprehension, writing, and grammar in Language Arts?

**Null Hypothesis 2-1.** There is no significant difference in third grade male students’ MCT2 percentage of questions answered correctly in vocabulary in Language Arts based on the type of classroom (single gender vs. mixed gender).

**Null Hypothesis 2-2.** There is no significant difference in third grade male students’ MCT2 percentage of questions answered correctly in reading comprehension in Language Arts based on the type of classroom (single gender vs. mixed gender).
Null Hypothesis 2-3. There is no significant difference in third grade male students’ MCT2 percentage of questions answered correctly in writing in Language Arts based on the type of classroom (single gender vs. mixed gender).

Null Hypothesis 2-4. There is no significant difference in third grade male students’ MCT2 percentage of questions answered correctly in grammar in Language Arts based on the type of classroom (single gender vs. mixed gender).

Null Hypothesis 2-5. There is no significant difference in fourth grade male students’ MCT2 percentage of questions answered correctly in vocabulary in Language Arts based on the type of classroom (single gender vs. mixed gender).

Null Hypothesis 2-6. There is no significant difference in fourth grade male students’ MCT2 percentage of questions answered correctly in reading comprehension in Language Arts based on the type of classroom (single gender vs. mixed gender).

Null Hypothesis 2-7. There is no significant difference in fourth grade male students’ MCT2 percentage of questions answered correctly in writing in Language Arts based on the type of classroom (single gender vs. mixed gender).

Null Hypothesis 2-8. There is no significant difference in fourth grade male students’ MCT2 percentage of questions answered correctly in grammar in Language Arts based on the type of classroom (single gender vs. mixed gender).

Null Hypothesis 2-9. There is no significant difference in fifth grade male students’ MCT2 percentage of questions answered correctly in vocabulary in Language Arts based on the type of classroom (single gender vs. mixed gender).
**Null Hypothesis 2-10.** There is no significant difference in fifth grade male students’ MCT2 percentage of questions answered correctly in reading comprehension in Language Arts based on the type of classroom (single gender vs. mixed gender).

**Null Hypothesis 2-11.** There is no significant difference in fifth grade male students’ MCT2 percentage of questions answered correctly in writing in Language Arts based on the type of classroom (single gender vs. mixed gender).

**Null Hypothesis 2-12.** There is no significant difference in fifth grade male students’ MCT2 percentage of questions answered correctly in reading comprehension in Language Arts based on the type of classroom (single gender vs. mixed gender).

**Participants**

There will not be any actual participants in the study. Actually, the school itself will be the only identifier in the study. No students or parents will need to be contacted, due to the fact the data will be presented by grade levels within the school. The names of students and teachers are not included in the study. The only contact needed will be the assistant superintendent of the school district; the researcher will present the study to the assistant superintendent for approval.

The school is an urban elementary school in the northeastern part of Mississippi. Ten total groups or classes are part of the study, five male single-gender classes and five mixed-gender classes. No female classes will be included in the study. The comparison groups for the sample are male students in single-gender classes in grades three, four, and five, and male students in mixed-gender classes in grades three, four, and five. The population of interest for the design is male students in grades three, four, and five; the population total is 437 total students, male and female, in grades three, four, and five. The ages of the participants range from 8-12. The study focuses on the Language Arts aspect of the curriculum; the curriculum
used is the Mississippi State Frameworks. The sample size is 222 male students in grades three, four, and five. 100 male students from the single-gender classes will be included in the sample, and 122 male students from the mixed-gender classes will be included. Ten total groups will be part of the study. There will be five single-gender groups and five mixed-gender groups. This population is targeted due to the fact this school had single-gender classes, the only school in the area to have single-gender classes.

The target population for the study is the male students at an urban, elementary school grades three, four, and five in single-gender classes and mixed-gender classes. Due to a manageable sampling size, this is also the accessible population. The researcher works within the school district of the elementary school used in the study, which could present a conflict of interest. For example, the researcher might be biased in favor of single-gender education because the program was piloted at the school. Also, the school had a successful year with high test scores and improved achievement, which the researcher might attribute to single-gender classes, while neglecting to factor in variables such as the classroom teacher.

The sampling frame for the study will be gathered from a student database system known as Student Administration Manager (SAM, Version 7) (2009). The database lists all students enrolled in the school, gender, teacher, as well as other pertinent information. Administrative rights enable the researcher to have access to this information. The database is updated on a daily basis adding to the reliability of accurate information useful to the study. The records updated to SAM6i are uploaded from the Mississippi state department’s student information database known as Mississippi Student Information System (MSIS).

The sampling procedure used is convenience sampling, or cluster (class) sampling. The nonprobability sampling technique known as convenience sampling is chosen for several
reasons: (1) The sample is located where the researcher works. (2) The researcher is the administrator needed to approve the data. (3) The data the researcher needs has already been collected (Gall et al., 2007). Potential biases include selecting a sample that is not representative of the entire population and a limitation of not being able to generalize the results to the entire population.

Setting

The setting of this study consists of an elementary school located in an urban, low socioeconomic area of Northeast Mississippi. This educational setting will be chosen because it provides an organizational program that consists of single-gender classes and mixed-gender classes. Teachers and students work together to achieve quality educational goals for all students. Teachers are actively engaged in identifying deficient areas while implementing strategies that promote success. The educational quality is ingrained in students through a systematic approach of concern (Harbin, 2007). The school is located in a city with a population of 34,211. Males comprise 47% of the population, and females comprise 53% of the population. The racial breakdown is comprised of the following: 68.7% whites, 28.3% African-Americans, 1.4% Hispanic, and 0.8% two or more races (Tupelo, MS, n.d.). For the 2011-2012 school year, the school had a total student enrollment of 437 students; there were 133 students in third grade, 154 students in fourth grade, and 150 students in fifth grade. Subgroup enrollment numbers are as follows: 50% females, 50% males, 1% Asian, 56% African-American, 5% Hispanic, and 38% white. The population is very diverse, with many of the students living in government housing. The economically disadvantaged students are at 59%, the highest in the district.

The enrollment in the single-gender classes is based on parent requests. Once slots are filled for at least two single-gender male classes in each grade level, students are placed on a
waiting list. For the study, there are two-single-gender male classes in each grade; the classes are not side-by-side, but spread throughout the school. However, the two-single-gender classes in each grade level are beside each other, due to the fact that male classes tend to have more volume than mixed-gender classes. All of the male single-gender classes are taught by female teachers. Furthermore, all of the teachers in the school received training in single-gender teaching strategies. There are also two single-gender female classes in each grade level, but they are not used as part of the study. Thus, there are six single-gender male classes in the school, six single-gender female classes, and fourteen mixed-gender classes.

**Instrumentation**

The Mississippi Curriculum Test, Version 2 (MCT2), a criterion-referenced, standardized test, is the preferred measurement to use for collecting data about the cause-and-effect relationship in this study. It is a measure of student achievement in Language Arts and Mathematics in grades three through eight based on the Mississippi Curriculum Framework. It is the basis for state accountability and is designed to meet the federal requirements of the No Child Left Behind Act of 2001. It contains test questions of varying degrees of difficulty that are aligned to the content, skills, and processes represented by Mississippi’s academic content standards as specified in the state curriculum frameworks and the academic performance level descriptors (Office of Student Assessment, 2011).

The Language Arts MCT2 for Grades 3-8, the focus for the study, measures student mastery of grade-level curriculum in vocabulary, reading, writing, and grammar. The test contains 50 multiple-choice items in 3rd grade, 50 in 4th grade, and 60 in 5th grade. The test included core items and experimental items, with only the core items being counted. Students receive four performance levels on the test: Advanced, Proficient, Basic, or Minimal. They
describe the content and processes a student is supposed to know, demonstrate, or perform (Office of Student Assessment, 2011). The number of questions a student answers correctly is the raw score; the raw score is converted to a scale score. The scale score is adjusted so the proficient scores start at 150 and the distribution of scores has a standard deviation of 10. Therefore, most scores will fall in the 120-180 range. The skills represented by each score point remain consistent from year to year to provide validation (Office of Student Assessment, 2011). Table 2 shows scale scores approved by the Mississippi Board of Education.
Table 2

*Performance Levels for MCT2 Language Arts*

<table>
<thead>
<tr>
<th>Grade Level</th>
<th>Label</th>
<th>Scale Score Ranges</th>
</tr>
</thead>
<tbody>
<tr>
<td>Third Grade</td>
<td>Advanced</td>
<td>162 and above*</td>
</tr>
<tr>
<td></td>
<td>Proficient</td>
<td>150–161</td>
</tr>
<tr>
<td></td>
<td>Basic</td>
<td>138–149</td>
</tr>
<tr>
<td></td>
<td>Minimal</td>
<td>137 and below*</td>
</tr>
<tr>
<td>Fourth Grade</td>
<td>Advanced</td>
<td>162 and above*</td>
</tr>
<tr>
<td></td>
<td>Proficient</td>
<td>150–161</td>
</tr>
<tr>
<td></td>
<td>Basic</td>
<td>138–149</td>
</tr>
<tr>
<td></td>
<td>Minimal</td>
<td>137 and below*</td>
</tr>
<tr>
<td>Fifth Grade</td>
<td>Advanced</td>
<td>164 and above*</td>
</tr>
<tr>
<td></td>
<td>Proficient</td>
<td>150–163</td>
</tr>
<tr>
<td></td>
<td>Basic</td>
<td>138–149</td>
</tr>
<tr>
<td></td>
<td>Minimal</td>
<td>137 and below*</td>
</tr>
</tbody>
</table>

*Note: * The lowest and highest possible attainable scale scores will vary as new forms are developed.

**Validity and Reliability**

In regards to validity and reliability, there are many facets to the creation and implementation of the MCT2. In its initial stages the test establishes the learning target, the cognitive demand is determined based on the curriculum, the test blueprint is developed, an appropriate passing score is determined, and an appropriate length of time for students to “hit” the learning target is determined (Kaase, 2007). Items on the MCT2 pass item and bias reviews before the test is administered. Upon completion of the test each spring, a test irregularity form
is distributed to test administrators for suggestions for improvements or questions about test items.

According to PEARSON (2010), “The focus of reliability is to ascertain the relationships among scores derived from individual items, whereas validity may refer to a collection of evidence to demonstrate test fairness and valid uses and interpretations of the test scores (p. 64).”

In regards to reliability, several methods are used. First, the *Cronbach’s Alpha*, a method used for the reliability of assessment scores that are multiple-choice answers with varying weights, is used for each of the MCT2 subject/grade tests for all students as well as subgroups (Gall et al., 2007). For third grade it is 0.89, fourth grade 0.87, and fifth grade 0.91. Secondly, classification accuracy and consistency are measured to test the extent to which students would be tested on all possible parallel forms of the assessment and the extent to which a student would be tested on a different test with equal difficulty as his/her original test. For 3rd grade accuracy is 0.78 and consistency is 0.69, 4th grade is 0.76 and 0.66, and 5th grade is 0.80 and 0.72. Also, differential item functioning (DIF) statistics are used to identify items on which members of a focal group have a different probability of getting items correct from members of a reference group when members are matched by the students’ ability on the test. Using differential item functioning enables the researcher to identify and remove assessment items that are unfair (Gall et al., 2007).

Finally, an inter-correlation among competencies is used to show the extent to which items aligned with the state competencies are assessing the same underlying construct. On the other hand, concurrent validity reports the correlation coefficients between the students’ performance on the MCT2 tests and selected demographics. Finally, unidimensionality is used to ensure a single common factor would underlay the subject tests. Factor analysis is used to find out how many varying factors are present in each of the assessments (PEARSON, 2010).
Procedures

The purpose of the study will be explained to the assistant superintendent and teachers in grades three, four, and five. Permission to use the school for the purpose of data collection will be obtained from the assistant superintendent in charge of grades K-5. There will be a permission form distributed to the assistant superintendent to obtain formal permission for the proposed research study. The letter states the researcher needs permission to gather test data for students in grades three, four, and five, noting that individual student names will not be discussed as part of the study; the data gathered will be archival.

The student information is collected from a program used called Student Administration Manager (SAM, Version 7) (2009). Standardized test data is collected using a program called EZ Tracker. EZ Test Tracker is a software program provided to the district by a company called Educational Leadership Solutions, Inc. The program is committed to providing user-friendly database-management tools to increase efficient and effective educators. The program tracks student MCT2 scores, including overall scale score for each student, along with the teacher’s name. The students will be tracked for one school year, August-May. The MCT2 assessment is given in May, and the data was available for viewing in July. Final results are distributed to the school in September. The information obtained from the data collection procedures is presented in a spreadsheet format, notably a Windows-based program such as Microsoft Excel. The school district’s testing coordinator will present the information in a spreadsheet using Microsoft Excel. The grade level achievement scores, teacher scores, and individual student scores are part of the online database. However, the data presented as part of the study will only describe grade level scores. No student names or teacher names will be revealed as part of the study. The data will be stripped and presented to the researcher by the school district’s testing coordinator. The
researcher will only receive data from each grade level with no teacher names or student names attached to the data.

Obtaining permission for the study from the Liberty University Institutional Review Board ensures that ethical practices and relevant explanations for the purpose of the study are being followed. First, presentation of a sound, rational study is presented to the dissertation committee and thesis chair for approval. Next, the Institutional Review Board application is completed, signed by the researcher and signed by thesis chair, and a copy e-mailed and a hard copy sent to the Institutional Review Board. Then, revisions are made based on a preliminary review, and the revised application is sent to the Institutional Review Board committee to review the project. Finally, revisions are made based on the Institutional Review Board’s recommendations and the application resent.

**Data Analysis**

Careful analysis of students in single-gender and mixed-gender classes will take place with a focus on the overall scale scores of males in grades three, four, and five, as well as individual sub-scale scores in vocabulary, reading comprehension, writing, and grammar. As stated earlier, the study will track students for a one-year period. No student identities and no teacher identities will be presented in the results of the study. No data will be recorded for any individual student. The results will be presented in an aggregated report. The mean scale score of students in third grade single-gender classes will be compared to the mean scale score of students in third grade mixed-gender classes. The results will be presented in a table. These results will be presented for overall student population in third grade. For fourth grade, the incoming mean scale score of students in single-gender classes will be compared to the incoming mean scale score of students in mixed-gender classes. These results will be presented in a table.
These results will be presented for overall student population in fourth grade. Finally, for fifth grade, the incoming mean scale score of students in single-gender classes will be compared to the incoming mean scale score of students in mixed-gender classes. These results will be presented in a table. These results will be presented for overall student population in fifth grade.

The study will be analyzed and reported through descriptive statistics to inform the reader of the most significant characteristics from the scores of each group. According to Gall et al. (2007), “Descriptive statistics are mathematical techniques for organizing and summarizing a set of numerical data” (p. 132). The descriptive statistics will report the means, percentages, and standard deviations of each group in a comparison table. Finally, a one-way ANOVA would be used to measure archival data for comparison purposes to determine the effect of the type of classroom, single-gender or mixed-gender, on the reading and writing MCT2 scale scores of male students in grades three through five. The scale scores of students in mixed-gender classes will be compared to the scale scores of students in single-gender classes. Using ANOVA allows for the researcher to match groups based on their involvement in a mixed-gender class or a single-gender class; using ANOVA also allows the researcher to match the variable of interest for the study when other relevant variables cannot be matched between the comparison groups (Gall et al., 2007). It also enables the researcher to limit the chances of committing a Type I error, which is more likely if multiple t-tests were used instead of ANOVA (Gall et al., 2007). In terms of determining if there is a statistically significant relationship between type of classroom and reading and writing MCT2 scale scores, ANOVA is best for analysis purposes. The probability level of $p < .05$ would be used to analyze significant differences. Lowering the probability level to $.01$ might result in a Type II error (Gall et al., 2007). According to Gall et al. (2007), educational researchers use this value to reject the null hypothesis (p. 139). Moore and
McCabe (1999) agree the .05 level is a good compromise to prevent committing a Type I and a Type II error. Using a probability level of less than .05 allows the researcher a little leeway in deciding if there is a true difference in the score results of students enrolled in a single-gender class compared to a mixed-gender class.

In order to use a one-way ANOVA, several assumptions must be met - independent observations, homogeneity of variances, normal distribution. When analyzing homogeneity of variances, Levene's Test for Equality of Variances will be used. The significance level will be set for .05. When testing for homogeneity of variances, if significance is found for scale scores or the sub-components of Language Arts, a Post Hoc test such as Tukey's HSD will be utilized to decipher where differences in the groups occurred.
CHAPTER FOUR: FINDINGS

There were two main purposes to the study: (a) to determine if the type of classroom (single gender vs. mixed gender) has an impact on grades three, four, and five male students’ Mississippi Curriculum Test, Version 2 (MCT2) scale scores in Language Arts, and (b) to determine if the type of classroom (single gender vs. mixed gender) has an impact on grades three, four, and five male students’ Mississippi Curriculum Test, Version 2 (MCT2) percentage of questions answered correctly in vocabulary, reading comprehension, writing, and grammar in Language Arts. The researcher utilized archival data from the 2011-2012 school year. The data gathered included the scale scores of males in single-gender classes and males in mixed-gender classes. It also included the overall percent correct of those students in vocabulary, reading comprehension, writing, and grammar. The research questions and hypotheses for the study focused on the overall achievement of males in Language Arts; the males in the study were either in a single-gender classroom or a mixed-gender classroom. The study also analyzed the components of Language Arts (vocabulary, reading, writing, and grammar) and compared how males in single-gender classes and males in mixed-gender classes performed on each one of them. The data were entered into SPSS to analyze if there was a significant difference in student achievement of males in single-gender classes compared to males in mixed-gender classes. The findings that follow illustrate the descriptive statistics for the study, address the assumptions for using a one-way ANOVA, provide an overview of the research questions and hypotheses, examine results from the one-way ANOVA tests, and present a summary of the findings.

Descriptive Statistics

For the study, the archival data were collected for the 2011-2012 school year. The data were collected from an urban elementary school in the northeastern part of the state, a school
with a high percentage of low socioeconomic students. The total population of the school for the 2011-2012 school year was 437 students. In the mixed-gender classes, 29.51% of the males were in third grade, 33.61% were in fourth grade, and 36.89% were in fifth grade. In the single-gender classes, 29% of the males were in third grade, 37% of the males were in fourth grade, and 34% of the males were in fifth grade. Using the K12ELS program, scale scores and percentages for male students were filtered for Language Arts. Scores and percentages were filtered by scale scores, vocabulary percentage, reading comprehension percentage, writing percentage, and grammar percentage. Then, the researcher exported the files to Microsoft Excel. After the scores were uploaded to Microsoft Excel, the table was created using the SPSS program.
Table 3

Descriptive Statistics for Scale Scores

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>1*</td>
<td>122</td>
<td>152.02</td>
<td>12.319</td>
<td>112</td>
<td>176</td>
</tr>
<tr>
<td>2*</td>
<td>100</td>
<td>153.31</td>
<td>14.705</td>
<td>110</td>
<td>182</td>
</tr>
<tr>
<td>Total</td>
<td>222</td>
<td>152.60</td>
<td>13.430</td>
<td>110</td>
<td>182</td>
</tr>
</tbody>
</table>

Note: * The number 1 represents males in mixed-gender classes; the number 2 represents males in single-gender classes.

Table 3 shows the total number of student scale scores involved in the study (N=222). The number of males in mixed-gender classes (n=122) and the number of males in single-gender classes (n=100) are also provided. Table 3 also displays the overall descriptive scale score achievement data from the MCT2 including the mean, standard deviation, the minimum score, and the maximum score. The scale scores ranged from 112-176 in mixed-gender classes and 110-182 in single-gender classes. Males in mixed-gender classes (M=152.02) scored slightly lower on average than males in single-gender classes (M=153.31). The standard deviation of males in mixed-gender classes (SD=12.32) was also lower than the standard deviation of males in single-gender classes (SD=14.71).
Table 4

*Overall Scale Score Third Grade*

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Std. Error</th>
<th>95% Confidence Interval for Mean</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Lower Bound</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Upper Bound</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1*</td>
<td>36</td>
<td>150.44</td>
<td>14.302</td>
<td>2.384</td>
<td>145.61</td>
<td>112</td>
<td>169</td>
</tr>
<tr>
<td>2*</td>
<td>29</td>
<td>151.62</td>
<td>15.914</td>
<td>2.955</td>
<td>145.57</td>
<td>112</td>
<td>182</td>
</tr>
<tr>
<td>Total</td>
<td>65</td>
<td>150.97</td>
<td>14.933</td>
<td>1.852</td>
<td>147.27</td>
<td>112</td>
<td>182</td>
</tr>
</tbody>
</table>

*Note:* * The number 1 represents males in mixed-gender classes; the number 2 represents males in single-gender classes.

Table 4 shows the total number of third grade student scale scores involved in the study (N=65). The number of males in mixed-gender classes (n=36) and the number of males in single-gender classes (n=29) are also provided. Table 4 also displays the overall descriptive scale score achievement data from the MCT2 including the mean, standard deviation, the minimum score, and the maximum score. The scale scores ranged from 112-169 in mixed-gender classes and 112-182 in single-gender classes. Males in mixed-gender classes (M=150.44) scored slightly lower on average than males in single-gender classes (M=151.62). The standard deviation of males in mixed-gender classes (SD=14.30) was also lower than the standard deviation of males in single-gender classes (SD=15.91).
Table 5

*Overall Scale Score Fourth Grade*

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Std. Error</th>
<th>95% Confidence Interval for Mean</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Lower Bound</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Upper Bound</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1*</td>
<td>41</td>
<td>151.98</td>
<td>11.438</td>
<td>1.786</td>
<td>148.37</td>
<td>131</td>
<td>175</td>
</tr>
<tr>
<td>2*</td>
<td>37</td>
<td>149.76</td>
<td>15.298</td>
<td>2.515</td>
<td>144.66</td>
<td>110</td>
<td>182</td>
</tr>
<tr>
<td>Total</td>
<td>78</td>
<td>150.92</td>
<td>13.365</td>
<td>1.513</td>
<td>147.91</td>
<td>110</td>
<td>182</td>
</tr>
</tbody>
</table>

Note: * The number 1 represents males in mixed-gender classes; the number 2 represents males in single-gender classes.

Table 5 shows the total number of fourth grade student scale scores involved in the study (N=78). The number of males in mixed-gender classes (n=41) and the number of males in single-gender classes (n=37) are also provided. Table 5 also displays the overall descriptive scale score achievement data from the MCT2 including the mean, standard deviation, the minimum score, and the maximum score. The scale scores ranged from 131-175 in mixed-gender classes and 110-182 in single-gender classes. Males in mixed-gender classes (M=151.98) scored higher on average than males in single-gender classes (M=149.76). The standard deviation of males in mixed-gender classes (SD=11.44) was lower than the standard deviation of males in single-gender classes (SD=15.30).
Table 6

*Overall Scale Score Fifth Grade*

Descriptives

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Std. Error</th>
<th>95% Confidence Interval for Mean</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Lower Bound</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Upper Bound</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1*</td>
<td>45</td>
<td>153.31</td>
<td>11.487</td>
<td>1.712</td>
<td>149.86</td>
<td>156.76</td>
<td>123</td>
</tr>
<tr>
<td>2*</td>
<td>34</td>
<td>158.62</td>
<td>11.526</td>
<td>1.977</td>
<td>154.60</td>
<td>162.64</td>
<td>126</td>
</tr>
<tr>
<td>Total</td>
<td>79</td>
<td>155.59</td>
<td>11.732</td>
<td>1.320</td>
<td>152.97</td>
<td>158.22</td>
<td>123</td>
</tr>
</tbody>
</table>

*Note:* *The number 1 represents males in mixed-gender classes; the number 2 represents males in single-gender classes.*

Table 6 shows the total number of fifth grade student scale scores involved in the study (N=79). The number of males in mixed-gender classes (n=45) and the number of males in single-gender classes (n=34) are also provided. Table 6 also displays the overall descriptive scale score achievement data from the MCT2 including the mean, standard deviation, the minimum score, and the maximum score. The scale scores ranged from 123-176 in mixed-gender classes and 126-181 in single-gender classes. Males in mixed-gender classes (M=153.31) scored lower on average than males in single-gender classes (M=158.62). The standard deviation of males in mixed-gender classes (SD=11.49) was lower than the standard deviation of males in single-gender classes (SD=15.53).
Table 7

*Overall Percent Correct in Vocabulary*

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Std. Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>1*</td>
<td>122</td>
<td>.575</td>
<td>.216</td>
<td>.020</td>
</tr>
<tr>
<td>2*</td>
<td>100</td>
<td>.598</td>
<td>.235</td>
<td>.023</td>
</tr>
<tr>
<td>Total</td>
<td>222</td>
<td>.585</td>
<td>.224</td>
<td>.015</td>
</tr>
</tbody>
</table>

*Note:* *The number 1 represents males in mixed-gender classes; the number 2 represents males in single-gender classes.*

Table 7 shows the overall percent correct in vocabulary for students involved in the study (N=222). The number of males in mixed-gender classes (n=122) and the number of males in single-gender classes (n=100) are provided. The percentages ranged from 0% to 100%. Twenty percent of the overall percent correct for males in vocabulary was at the 75th percentile (Md=75%). Males in single-gender classes (M=59.78%) had a higher percentage of correct answers in vocabulary on average than males in mixed-gender classes (M=57.52%). The standard deviation of males in single-gender classes (SD=23.47%) was also higher than the standard deviation of males in mixed-gender classes (SD=21.59%).
Table 8

*Overall Percent Correct in Third Grade Vocabulary*

Descriptives

<table>
<thead>
<tr>
<th>Third Grade Vocabulary</th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Std. Error</th>
<th>95% Confidence Interval for Mean</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Lower Bound</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Upper Bound</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1*</td>
<td>36</td>
<td>.5856</td>
<td>.22753</td>
<td>.03792</td>
<td>.5086</td>
<td>.6625</td>
<td>.00</td>
</tr>
<tr>
<td>2*</td>
<td>29</td>
<td>.5503</td>
<td>.26297</td>
<td>.04883</td>
<td>.4503</td>
<td>.6504</td>
<td>.13</td>
</tr>
<tr>
<td>Total</td>
<td>65</td>
<td>.5698</td>
<td>.24264</td>
<td>.03010</td>
<td>.5097</td>
<td>.6300</td>
<td>.00</td>
</tr>
</tbody>
</table>

*Note: * The number 1 represents males in mixed-gender classes; the number 2 represents males in single-gender classes.

Table 8 shows the overall percent correct in vocabulary for third grade students involved in the study (N=65). The number of males in mixed-gender classes (n=36) and the number of males in single-gender classes (n=29) are provided. Males in single-gender classes (M=55.03%) had a lower percentage of correct answers in vocabulary on average than males in mixed-gender classes (M=58.56%). The standard deviation of males in single-gender classes (SD=26.30%) was higher than the standard deviation of males in mixed-gender classes (SD=22.75%).
Table 9

Overall Percent Correct in Fourth Grade Vocabulary

Descriptives

<table>
<thead>
<tr>
<th>Fourth Grade Vocabulary</th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Std. Error</th>
<th>95% Confidence Interval for Mean</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Lower Bound</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Upper Bound</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1*</td>
<td>41</td>
<td>.6120</td>
<td>.21112</td>
<td>.03297</td>
<td>.5453</td>
<td>.25</td>
<td>1.00</td>
</tr>
<tr>
<td>2*</td>
<td>37</td>
<td>.6143</td>
<td>.23489</td>
<td>.03862</td>
<td>.5360</td>
<td>.00</td>
<td>1.00</td>
</tr>
<tr>
<td>Total</td>
<td>78</td>
<td>.6131</td>
<td>.22125</td>
<td>.02505</td>
<td>.5632</td>
<td>.00</td>
<td>1.00</td>
</tr>
</tbody>
</table>

Note: * The number 1 represents males in mixed-gender classes; the number 2 represents males in single-gender classes.

Table 9 shows the overall percent correct in vocabulary for fourth grade students involved in the study (N=78). The number of males in mixed-gender classes (n=41) and the number of males in single-gender classes (n=37) are provided. Males in single-gender classes (M=61.43%) had a slightly higher percentage of correct answers in vocabulary on average than males in mixed-gender classes (M=61.20%). The standard deviation of males in single-gender classes (SD=23.49%) was higher than the standard deviation of males in mixed-gender classes (SD=21.11%).
Table 10

*Overall Percent Correct in Fifth Grade Vocabulary*

| Descriptives | 
|----------------|----------------|
| Fifth Grade Vocabulary | |
| | N | Mean | Std. Deviation | Std. Error | 95% Confidence Interval for Mean | Min | Max |
| | | | | | Lower Bound | Upper Bound | |
| 1* | 45 | .5333 | .20808 | .03102 | .4708 | .5958 | .13 | 1.00 |
| 2* | 34 | .6203 | .20887 | .03582 | .5474 | .6932 | .25 | 1.00 |
| Total | 79 | .5708 | .21156 | .02380 | .5234 | .6181 | .13 | 1.00 |

Note: * The number 1 represents males in mixed-gender classes; the number 2 represents males in single-gender classes.

Table 10 shows the overall percent correct in vocabulary for fifth grade students involved in the study (N=79). The number of males in mixed-gender classes (n=45) and the number of males in single-gender classes (n=34) are provided. Males in single-gender classes (M=62.03%) had a higher percentage of correct answers in vocabulary on average than males in mixed-gender classes (M=53.33%). The standard deviation of males in single-gender classes (SD=20.89%) was slightly higher than the standard deviation of males in mixed-gender classes (SD=20.81%).
Table 11

Overall Percent Correct in Reading Comprehension

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>READING</td>
<td>1*</td>
<td>122</td>
<td>.540</td>
</tr>
<tr>
<td></td>
<td>2*</td>
<td>100</td>
<td>.567</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>222</td>
<td>.552</td>
</tr>
</tbody>
</table>

*Note: *The number 1 represents males in mixed-gender classes; the number 2 represents males in single-gender classes.*

Table 11 shows the overall percent correct in reading comprehension for students involved in the study (N=222). Males in single-gender classes (M=56.66%) had a higher percentage of correct answers in reading comprehension on average than males in mixed-gender classes (M=54.03%). The standard deviation of males in single-gender classes (SD=22.99%) was also higher than the standard deviation of males in mixed-gender classes (SD=18.72%).
Table 12

*Overall Percent Correct in Third Grade Reading Comprehension*

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Std. Error</th>
<th>Lower Bound</th>
<th>Upper Bound</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>1*</td>
<td>36</td>
<td>.5383</td>
<td>.17948</td>
<td>.02991</td>
<td>.4776</td>
<td>.5991</td>
<td>.12</td>
<td>.82</td>
</tr>
<tr>
<td>2*</td>
<td>29</td>
<td>.5421</td>
<td>.24715</td>
<td>.04589</td>
<td>.4481</td>
<td>.6361</td>
<td>.06</td>
<td>.94</td>
</tr>
<tr>
<td>Total</td>
<td>65</td>
<td>.5400</td>
<td>.21058</td>
<td>.02612</td>
<td>.4878</td>
<td>.5922</td>
<td>.06</td>
<td>.94</td>
</tr>
</tbody>
</table>

*Note:* *The number 1 represents males in mixed-gender classes; the number 2 represents males in single-gender classes.*

Table 12 shows the overall percent correct in reading comprehension for third grade students involved in the study ($N=65$). Males in single-gender classes ($M=54.21\%$) had a higher percentage of correct answers in reading comprehension on average than males in mixed-gender classes ($M=53.83\%$). The standard deviation of males in single-gender classes ($SD=24.72\%$) was also higher than the standard deviation of males in mixed-gender classes ($SD=17.95\%$).
Table 13

*Overall Percent Correct in Fourth Grade Reading Comprehension*

Descriptives

<table>
<thead>
<tr>
<th>Fourth Grade Reading Comprehension</th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Std. Error</th>
<th>95% Confidence Interval for Mean</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Lower Bound</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Upper Bound</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1*</td>
<td>41</td>
<td>.4990</td>
<td>.19141</td>
<td>.02989</td>
<td>.4386</td>
<td>.5594</td>
<td>.12</td>
</tr>
<tr>
<td>2*</td>
<td>37</td>
<td>.4916</td>
<td>.21998</td>
<td>.03616</td>
<td>.4183</td>
<td>.5650</td>
<td>.18</td>
</tr>
<tr>
<td>Total</td>
<td>78</td>
<td>.4955</td>
<td>.20414</td>
<td>.02311</td>
<td>.4495</td>
<td>.5415</td>
<td>.12</td>
</tr>
</tbody>
</table>

*Note:* * The number 1 represents males in mixed-gender classes; the number 2 represents males in single-gender classes.

Table 13 shows the overall percent correct in reading comprehension for fourth grade students involved in the study (N=78). Males in single-gender classes (M=49.16%) had a slightly lower percentage of correct answers in reading comprehension on average than males in mixed-gender classes (M=49.90%). The standard deviation of males in single-gender classes (SD=22.00%) was higher than the standard deviation of males in mixed-gender classes (SD=19.14%).
Table 14

**Overall Percent Correct in Fifth Grade Reading Comprehension**

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Std. Error</th>
<th>95% Confidence Interval for Mean</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Lower Bound</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Upper Bound</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1*</td>
<td>45</td>
<td>.5796</td>
<td>.18509</td>
<td>.02759</td>
<td>.5239</td>
<td>.6352</td>
<td>.27</td>
</tr>
<tr>
<td>2*</td>
<td>34</td>
<td>.6691</td>
<td>.19032</td>
<td>.03264</td>
<td>.6027</td>
<td>.7355</td>
<td>.23</td>
</tr>
<tr>
<td>Total</td>
<td>79</td>
<td>.6181</td>
<td>.19142</td>
<td>.02154</td>
<td>.5752</td>
<td>.6610</td>
<td>.23</td>
</tr>
</tbody>
</table>

*Note:* * The number 1 represents males in mixed-gender classes; the number 2 represents males in single-gender classes.

Table 14 shows the overall percent correct in reading comprehension for fifth grade students involved in the study (N=79). Males in single-gender classes (M=66.91%) had a higher percentage of correct answers in reading comprehension on average than males in mixed-gender classes (M=57.96%). The standard deviation of males in single-gender classes (SD=19.03%) was also higher than the standard deviation of males in mixed-gender classes (SD=18.51%).
Table 15

*Overall Percent Correct in Writing*

<table>
<thead>
<tr>
<th>Descriptives</th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>WRITING</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1*</td>
<td>122</td>
<td>.600</td>
<td>.210</td>
</tr>
<tr>
<td>2*</td>
<td>100</td>
<td>.613</td>
<td>.234</td>
</tr>
<tr>
<td>Total</td>
<td>222</td>
<td>.605</td>
<td>.221</td>
</tr>
</tbody>
</table>

*Note:* * The number 1 represents males in mixed-gender classes; the number 2 represents males in single-gender classes.

Table 15 shows the overall percent correct in writing for students involved in the study (N=222). The number of males in mixed-gender classes (n=122) and the number of males in single-gender classes (n=100) are also provided. Males in single-gender classes (M=61.33%) had a higher percentage of correct answers in writing on average than males in mixed-gender classes (M=59.89%). The standard deviation of males in single-gender classes (SD=23.45%) was also higher than the standard deviation of males in mixed-gender classes (SD=21.02%).
Table 16  

**Overall Percent Correct in Third Grade Writing**

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Std. Error</th>
<th>95% Confidence Interval for Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Lower Bound</td>
</tr>
<tr>
<td>1*</td>
<td>36</td>
<td>.6578</td>
<td>.23423</td>
<td>.03904</td>
<td>.5785</td>
</tr>
<tr>
<td>2*</td>
<td>29</td>
<td>.6966</td>
<td>.24772</td>
<td>.04600</td>
<td>.6023</td>
</tr>
<tr>
<td>Total</td>
<td>65</td>
<td>.6751</td>
<td>.23922</td>
<td>.02967</td>
<td>.6158</td>
</tr>
</tbody>
</table>

*Note:* * The number 1 represents males in mixed-gender classes; the number 2 represents males in single-gender classes.

Table 16 shows the overall percent correct in writing for third grade students involved in the study (*N*=65). The number of males in mixed-gender classes (*n*=36) and the number of males in single-gender classes (*n*=29) are also provided. Males in single-gender classes (*M*=69.66%) had a higher percentage of correct answers in writing on average than males in mixed-gender classes (*M*=65.78%). The standard deviation of males in single-gender classes (*SD*=24.77%) was also higher than the standard deviation of males in mixed-gender classes (*SD*=23.42%).
### Table 17

**Overall Percent Correct in Fourth Grade Writing**

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Std. Error</th>
<th>Lower Bound</th>
<th>Upper Bound</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>1* Male in mixed-gender classes</td>
<td>41</td>
<td>.6161</td>
<td>.19956</td>
<td>.03117</td>
<td>.5531</td>
<td>.6791</td>
<td>.23</td>
<td>.92</td>
</tr>
<tr>
<td>2* Male in single-gender classes</td>
<td>37</td>
<td>.5359</td>
<td>.24010</td>
<td>.03947</td>
<td>.4559</td>
<td>.6160</td>
<td>.00</td>
<td>.92</td>
</tr>
<tr>
<td>Total</td>
<td>78</td>
<td>.5781</td>
<td>.22195</td>
<td>.02513</td>
<td>.5280</td>
<td>.6281</td>
<td>.00</td>
<td>.92</td>
</tr>
</tbody>
</table>

*Note: * The number 1 represents males in mixed-gender classes; the number 2 represents males in single-gender classes.

Table 17 shows the overall percent correct in writing for fourth grade students involved in the study (N=78). The number of males in mixed-gender classes (n=41) and the number of males in single-gender classes (n=37) are also provided. Males in single-gender classes (M=53.59%) had a lower percentage of correct answers in writing on average than males in mixed-gender classes (M=61.61%). The standard deviation of males in single-gender classes (SD=24.01%) was higher than the standard deviation of males in mixed-gender classes (SD=19.96%).
Table 18

*Overall Percent Correct in Fifth Grade Writing*

<table>
<thead>
<tr>
<th>Fifth Grade Writing</th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Std. Error</th>
<th>95% Confidence Interval for Mean</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Lower Bound</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Upper Bound</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1*</td>
<td>45</td>
<td>.5360</td>
<td>.18583</td>
<td>.02770</td>
<td>.4802</td>
<td>.5918</td>
<td>.06</td>
</tr>
<tr>
<td>2*</td>
<td>34</td>
<td>.6265</td>
<td>.19257</td>
<td>.03303</td>
<td>.5593</td>
<td>.6937</td>
<td>.13</td>
</tr>
<tr>
<td>Total</td>
<td>79</td>
<td>.5749</td>
<td>.19288</td>
<td>.02170</td>
<td>.5317</td>
<td>.6181</td>
<td>.06</td>
</tr>
</tbody>
</table>

*Note:* * The number 1 represents males in mixed-gender classes; the number 2 represents males in single-gender classes.

Table 18 shows the overall percent correct in writing for fifth grade students involved in the study (N=79). The number of males in mixed-gender classes (n=45) and the number of males in single-gender classes (n=34) are also provided. Males in single-gender classes (M=62.65%) had a higher percentage of correct answers in writing on average than males in mixed-gender classes (M=53.60%). The standard deviation of males in single-gender classes (SD=19.26%) was higher than the standard deviation of males in mixed-gender classes (SD=18.58%).
Table 19

*Overall Percent Correct in Grammar*

<table>
<thead>
<tr>
<th>Descriptives</th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>GRAMMAR 1*</td>
<td>122</td>
<td>.590</td>
<td>.222</td>
</tr>
<tr>
<td>2*</td>
<td>100</td>
<td>.590</td>
<td>.221</td>
</tr>
<tr>
<td>Total</td>
<td>222</td>
<td>.590</td>
<td>.221</td>
</tr>
</tbody>
</table>

*Note: *The number 1 represents males in mixed-gender classes; the number 2 represents males in single-gender classes.*

Table 19 shows the overall percent correct in grammar for students involved in the study (N=222). The number of males in mixed-gender classes (n=122) and the number of males in single-gender classes (n=100) are also provided. Differing from the other sub-categories of vocabulary, reading comprehension, and writing, males in mixed-gender classes (M=59.00%) had an equal percentage of correct answers in grammar on average with males in single-gender classes (M=59.00%). The standard deviation of males in mixed-gender classes (SD=22.19%) was slightly higher than the standard deviation of males in single-gender classes (SD=22.13%). This was also different than the results in vocabulary, reading comprehension, and writing.
Table 20

*Overall Percent Correct in Third Grade Grammar*

<table>
<thead>
<tr>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Std. Error</th>
<th>95% Confidence Interval for Mean</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Lower Bound</td>
<td>Upper Bound</td>
<td></td>
</tr>
<tr>
<td>1*</td>
<td>36</td>
<td>.6222</td>
<td>.21655</td>
<td>.03609</td>
<td>.5490</td>
<td>.6955</td>
</tr>
<tr>
<td>2*</td>
<td>29</td>
<td>.6045</td>
<td>.22275</td>
<td>.04136</td>
<td>.5198</td>
<td>.6892</td>
</tr>
<tr>
<td>Total</td>
<td>65</td>
<td>.6143</td>
<td>.21779</td>
<td>.02701</td>
<td>.5603</td>
<td>.6683</td>
</tr>
</tbody>
</table>

*Note:* * The number 1 represents males in mixed-gender classes; the number 2 represents males in single-gender classes.

Table 20 shows the overall percent correct in grammar for third grade students involved in the study (N=65). The number of males in mixed-gender classes (n=36) and the number of males in single-gender classes (n=29) are also provided. Males in single-gender classes (M=60.45%) had a lower percentage of correct answers in writing on average than males in mixed-gender classes (M=62.22%). The standard deviation of males in mixed-gender classes (SD=21.66%) was lower than the standard deviation of males in single-gender classes (SD=22.28%).
Table 21

Overall Percent Correct in Fourth Grade Grammar

Descriptives

<table>
<thead>
<tr>
<th>Fourth Grade Grammar</th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Std. Error</th>
<th>95% Confidence Interval for Mean</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Lower Bound</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Upper Bound</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1*</td>
<td>41</td>
<td>.5563</td>
<td>.23533</td>
<td>.03675</td>
<td>.4821</td>
<td>.17</td>
<td>.92</td>
</tr>
<tr>
<td>2*</td>
<td>37</td>
<td>.5381</td>
<td>.22927</td>
<td>.03769</td>
<td>.4617</td>
<td>.08</td>
<td>1.00</td>
</tr>
<tr>
<td>Total</td>
<td>78</td>
<td>.5477</td>
<td>.23115</td>
<td>.02617</td>
<td>.4956</td>
<td>.08</td>
<td>1.00</td>
</tr>
</tbody>
</table>

Note: * The number 1 represents males in mixed-gender classes; the number 2 represents males in single-gender classes.

Table 21 shows the overall percent correct in grammar for fourth grade students involved in the study (N=78). The number of males in mixed-gender classes (n=41) and the number of males in single-gender classes (n=37) are also provided. Males in single-gender classes (M=53.81%) had a lower percentage of correct answers in grammar on average than males in mixed-gender classes (M=55.63%). The standard deviation of males in mixed-gender classes (SD=23.53%) was also higher than the standard deviation of males in single-gender classes (SD=22.93%).
Table 22

**Overall Percent Correct in Fifth Grade Grammar**

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Std. Error</th>
<th>95% Confidence Interval for Mean</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Lower Bound</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Upper Bound</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1*</td>
<td>45</td>
<td>.5938</td>
<td>.21412</td>
<td>.03192</td>
<td>.5294</td>
<td>.6581</td>
<td>.07</td>
</tr>
<tr>
<td>2*</td>
<td>34</td>
<td>.6324</td>
<td>.20606</td>
<td>.03534</td>
<td>.5605</td>
<td>.7043</td>
<td>.21</td>
</tr>
<tr>
<td>Total</td>
<td>79</td>
<td>.6104</td>
<td>.21023</td>
<td>.02365</td>
<td>.5633</td>
<td>.6575</td>
<td>.07</td>
</tr>
</tbody>
</table>

*Note: * The number 1 represents males in mixed-gender classes; the number 2 represents males in single-gender classes.

Table 22 shows the overall percent correct in grammar for fifth grade students involved in the study (N=79). The number of males in mixed-gender classes (n=45) and the number of males in single-gender classes (n=34) are also provided. Males in single-gender classes (M=63.24%) had a higher percentage of correct answers in grammar on average than males in mixed-gender classes (M=59.38%). The standard deviation of males in mixed-gender classes (SD=21.41%) was higher than the standard deviation of males in single-gender classes (SD=20.61%).

**Assumptions**

Before running a one-way ANOVA, the researcher performed statistical tests to ensure the assumptions were met for utilizing a one-way ANOVA. According to Larson (2008), assumptions that must be met in order to use a one-way ANOVA include independent observations, homogeneous variance, and normal distribution.

The first assumption for using a one-way ANOVA is that there must be independent observations. The way the researcher addressed this assumption is by evaluating the method of
collecting data. The students whose scale scores and percentage of questions answered correctly took the MCT2 independently from one another. The school devised a test security plan to ensure students in single-gender classes and students in mixed-gender classes had no interaction during the assessment. Students were not allowed to talk during the assessment period; this included times students were outside of the classroom; for example, the restroom, cafeteria, or hallway. Finally, the state of Mississippi ensures each assessment administered every spring is different from previous versions of the assessment.

The second assumption involves determining if there is homogeneity of variances. Homogeneity of variances compares differences between variances in a set of scores obtained from independent samples (Gall et al., 2007). In 1960, Professor Howard Levene developed a test for the equality of variances of populations. His test, Levene's Test for Equality of Variances, tests the assumption of homogeneity of variances for ANOVA statistical tests (Katz, Lee, & Restori, 2009). For the first research question, the assumption of homogeneity of variances was tested and found tenable using Levene's Test for Equality of Variances, $F(1, 220, p = .079)$. For the second research question, the homogeneity of variances was tested and found tenable using Levene's Test for Equality of Variances for vocabulary, $F(1, 220, p = .344)$, writing, $F(1, 220, p = .330)$, and grammar, $F(1, 220, p = .899)$; however, reading comprehension was found to be significant, $F(1, 220, p = .001)$. The assumption of homogeneity of variance was violated for reading comprehension; therefore, the Welch $F$-ratio is reported. There was not a significant effect on percentage of questions answered correctly in reading comprehension for males in single-gender classes compared to males in mixed-gender classes, $F(1, 190) = .846, p = .359$ using the Welch $F$-ratio.
The third and final assumption is the assumption of normal distribution. The probability p-plot graphs below show scale score distribution for males in mixed-gender classes (Figure 1) and males in single-gender classes (Figure 2). Based on the results from the graphs, the researcher has confirmed the assumption that normality has been met.
Figure 1. Probability Plot of overall scale scores of males in mixed-gender classes.
Figure 2. Probability Plot of overall scale scores of males in single-gender classes.

Research Results

Results are presented below for each hypothesis.

Null Hypothesis 1-1. There is no significant difference in third grade male students’ MCT2 scale scores in Language Arts in single gender classrooms as compared to a mixed gender classroom.
Overall for third grade, the one-way ANOVA was not significant, \( F(1, 63) = .098, p = .755 \). Thus, there is not significant evidence to reject the null hypothesis and conclude there is a significant effect on the overall scale MCT2 scale scores in Language Arts of mixed-gender males in third grade compared to single-gender males in third grade. Furthermore, the actual difference in the mean scores between groups was quite small based on Cohen's (1988) conventions for interpreting effect size. Table 23 shows a summary of third grade male student scale scores using a one-way ANOVA.

**Null Hypothesis 1-2.** There is no significant difference in fourth grade male students’ MCT2 scale scores in Language Arts in single gender classrooms as compared to a mixed gender classroom.
Table 24

One-way ANOVA for Fourth Grade Scale Scores

<table>
<thead>
<tr>
<th></th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Groups</td>
<td>95.752</td>
<td>1</td>
<td>95.752</td>
<td>.533</td>
<td>.468</td>
</tr>
<tr>
<td>Within Groups</td>
<td>13657.786</td>
<td>76</td>
<td>179.708</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>13753.538</td>
<td>77</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Overall for fourth grade, the one-way ANOVA was not significant, $F(1, 76) = .533, p = .468$. Thus, there is not significant evidence to reject the null hypothesis and conclude there is a significant effect on the overall scale MCT2 scale scores in Language Arts of mixed-gender males in fourth grade compared to single-gender males in fourth grade. Furthermore, the actual difference in the mean scores between groups was quite small based on Cohen's (1988) conventions for interpreting effect size. Table 24 shows a summary of fourth grade male student scale scores using a one-way ANOVA.

Null Hypothesis 1-3. There is no significant difference in fifth grade male students’ MCT2 scale scores in Language Arts in single gender classrooms as compared to a mixed gender classroom.
<table>
<thead>
<tr>
<th></th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Groups</td>
<td>545.364</td>
<td>1</td>
<td>545.364</td>
<td>4.121</td>
<td>.046</td>
</tr>
<tr>
<td>Within Groups</td>
<td>10189.674</td>
<td>77</td>
<td>132.333</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>10735.038</td>
<td>78</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Overall for fifth grade, the one-way ANOVA was significant, $F (1, 77) = 4.121, p = .046$. Thus, there is significant evidence to reject the null hypothesis and conclude there is a significant effect on the overall scale MCT2 scale scores in Language Arts of mixed-gender males in fifth grade compared to single-gender males in fifth grade. Furthermore, the actual difference in the mean scores between groups was moderate based on Cohen's (1988) conventions for interpreting effect size. Table 25 shows a summary of fifth grade male student scale scores using a one-way ANOVA.

**Null Hypothesis 2-1.** There is no significant difference in third grade male students’ MCT2 percentage of questions answered correctly in vocabulary in Language Arts based on the type of classroom (single gender vs. mixed gender).
Overall for third grade, the one-way ANOVA was not significant, $F(1, 63) = .335, p = .565$. Thus, there is not significant evidence to reject the null hypothesis and conclude there is a significant difference in third grade male students’ MCT2 percentage of questions answered correctly in vocabulary in Language Arts. Furthermore, the actual difference in the mean scores between groups was quite small based on Cohen’s (1988) conventions for interpreting effect size. Table 26 shows a summary of third grade male student percentages using a one-way ANOVA.

**Null Hypothesis 2-2.** There is no significant difference in third grade male students’ MCT2 percentage of questions answered correctly in reading comprehension in Language Arts based on the type of classroom (single gender vs. mixed gender).
Overall for third grade, the one-way ANOVA was not significant, $F(1, 63) = .005, p = .944$. Thus, there is not significant evidence to reject the null hypothesis and conclude there is a significant difference in third grade male students’ MCT2 percentage of questions answered correctly in reading comprehension in Language Arts. Furthermore, the actual difference in the mean scores between groups was quite small based on Cohen's (1988) conventions for interpreting effect size. Table 27 shows a summary of third grade male student percentages using a one-way ANOVA.

**Null Hypothesis 2-3.** There is no significant difference in third grade male students’ MCT2 percentage of questions answered correctly in writing in Language Arts based on the type of classroom (single gender vs. mixed gender).
Table 28

One-way ANOVA for Third Grade Overall Percent Correct in Writing

ANOVA

<table>
<thead>
<tr>
<th></th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Groups</td>
<td>.024</td>
<td>1</td>
<td>.024</td>
<td>.418</td>
<td>.520</td>
</tr>
<tr>
<td>Within Groups</td>
<td>3.638</td>
<td>63</td>
<td>.058</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>3.663</td>
<td>64</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Overall for third grade, the one-way ANOVA was not significant, $F (1, 63) = .418, p = .520$. Thus, there is not significant evidence to reject the null hypothesis and conclude there is a significant difference in third grade male students’ MCT2 percentage of questions answered correctly in vocabulary in Language Arts. Furthermore, the actual difference in the mean scores between groups was quite small based on Cohen's (1988) conventions for interpreting effect size. Table 28 shows a summary of third grade male student percentages using a one-way ANOVA.

**Null Hypothesis 2-4.** There is no significant difference in third grade male students’ MCT2 percentage of questions answered correctly in grammar in Language Arts based on the type of classroom (single gender vs. mixed gender).
Overall for third grade, the one-way ANOVA was not significant, $F(1, 63) = .105, p = .747$. Thus, there is not significant evidence to reject the null hypothesis and conclude there is a significant difference in third grade male students’ MCT2 percentage of questions answered correctly in vocabulary in Language Arts. Furthermore, the actual difference in the mean scores between groups was quite small based on Cohen’s (1988) conventions for interpreting effect size. Table 29 shows a summary of third grade male student percentages using a one-way ANOVA.

**Null Hypothesis 2-5.** There is no significant difference in fourth grade male students’ MCT2 percentage of questions answered correctly in vocabulary in Language Arts based on the type of classroom (single gender vs. mixed gender).
Table 30

One-way ANOVA for Fourth Grade Overall Percent Correct in Vocabulary

<table>
<thead>
<tr>
<th></th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Groups</td>
<td>.000</td>
<td>1</td>
<td>.000</td>
<td>.002</td>
<td>.963</td>
</tr>
<tr>
<td>Within Groups</td>
<td>3.769</td>
<td>76</td>
<td>.050</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>3.769</td>
<td>77</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Overall for fourth grade, the one-way ANOVA was not significant, $F (1, 76) = .002, p = .963$. Thus, there is not significant evidence to reject the null hypothesis and conclude there is a significant effect on the overall percent correct for vocabulary in Language Arts of mixed-gender males in fourth grade compared to single-gender males in fourth grade. Furthermore, the actual difference in the mean scores between groups was small based on Cohen's (1988) conventions for interpreting effect size. Table 30 shows a summary of fourth grade male student overall percent correct in vocabulary using a one-way ANOVA.

**Null Hypothesis 2-6.** There is no significant difference in fourth grade male students’ MCT2 percentage of questions answered correctly in reading comprehension in Language Arts based on the type of classroom (single gender vs. mixed gender).
Overall for fourth grade, the one-way ANOVA was not significant, $F(1, 76) = .025, p = .874$. Thus, there is not significant evidence to reject the null hypothesis and conclude there is a significant effect on the overall percent correct for reading comprehension in Language Arts of mixed-gender males in fourth grade compared to single-gender males in fourth grade. Furthermore, the actual difference in the mean scores between groups was small based on Cohen's (1988) conventions for interpreting effect size. Table 31 shows a summary of fourth grade male student overall percent correct in reading comprehension using a one-way ANOVA.

**Null Hypothesis 2-7.** There is no significant difference in fourth grade male students’ MCT2 percentage of questions answered correctly in writing in Language Arts based on the type of classroom (single gender vs. mixed gender).

---

<table>
<thead>
<tr>
<th></th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Groups</td>
<td>.001</td>
<td>1</td>
<td>.001</td>
<td>.025</td>
<td>.874</td>
</tr>
<tr>
<td>Within Groups</td>
<td>3.208</td>
<td>76</td>
<td>.042</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>3.209</td>
<td>77</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Overall for fourth grade, the one-way ANOVA was not significant, $F(1, 76) = 2.589$, $p = .112$. Thus, there is not significant evidence to reject the null hypothesis and conclude there is a significant effect on the overall percent correct for writing in Language Arts of mixed-gender males in fourth grade compared to single-gender males in fourth grade. Furthermore, the actual difference in the mean scores between groups was small based on Cohen's (1988) conventions for interpreting effect size. Table 32 shows a summary of fourth grade male student overall percent correct in writing using a one-way ANOVA.

**Null Hypothesis 2-8.** There is no significant difference in fourth grade male students’ MCT2 percentage of questions answered correctly in grammar in Language Arts based on the type of classroom (single gender vs. mixed gender).
Table 33

*One-way ANOVA for Fourth Grade Overall Percent Correct in Grammar*

<table>
<thead>
<tr>
<th>Fourth Grade Grammar</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Groups</td>
<td>.006</td>
<td>1</td>
<td>.006</td>
<td>.120</td>
<td>.730</td>
</tr>
<tr>
<td>Within Groups</td>
<td>4.108</td>
<td>76</td>
<td>.054</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>4.114</td>
<td>77</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Overall for fourth grade, the one-way ANOVA was not significant, $F(1, 76) = .120, p = .730$. Thus, there is not significant evidence to reject the null hypothesis and conclude there is a significant effect on the overall percent correct for grammar in Language Arts of mixed-gender males in fourth grade compared to single-gender males in fourth grade. Furthermore, the actual difference in the mean scores between groups was small based on Cohen's (1988) conventions for interpreting effect size. Table 33 shows a summary of fourth grade male student overall percent correct in grammar using a one-way ANOVA.

**Null Hypothesis 2-9.** There is no significant difference in fifth grade male students’ MCT2 percentage of questions answered correctly in vocabulary in Language Arts based on the type of classroom (single gender vs. mixed gender).
Table 34

One-way ANOVA for Fifth Grade Overall Percent Correct in Vocabulary

ANOVA

<table>
<thead>
<tr>
<th></th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Groups</td>
<td>.146</td>
<td>1</td>
<td>.146</td>
<td>3.372</td>
<td>.070</td>
</tr>
<tr>
<td>Within Groups</td>
<td>3.345</td>
<td>77</td>
<td>.043</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>3.491</td>
<td>78</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Overall for fifth grade, the one-way ANOVA was not significant, $F (1, 77) = 3.372$, $p = .070$. Thus, there is not significant evidence to reject the null hypothesis and conclude there is a significant difference in third grade male students’ MCT2 percentage of questions answered correctly in vocabulary in Language Arts. Furthermore, the actual difference in the mean scores between groups was quite small based on Cohen's (1988) conventions for interpreting effect size. Table 34 shows a summary of fifth grade male student percentages using a one-way ANOVA.

Null Hypothesis 2-10. There is no significant difference in fifth grade male students’ MCT2 percentage of questions answered correctly in reading comprehension in Language Arts based on the type of classroom (single gender vs. mixed gender).
Table 35

One-way ANOVA for Fifth Grade Overall Percent Correct in Reading Comprehension

ANOVA

<table>
<thead>
<tr>
<th></th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Groups</td>
<td>.155</td>
<td>1</td>
<td>.155</td>
<td>4.426</td>
<td>.039</td>
</tr>
<tr>
<td>Within Groups</td>
<td>2.703</td>
<td>77</td>
<td>.035</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>2.858</td>
<td>78</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Overall for fifth grade, the one-way ANOVA was significant, $F(1, 77) = 4.426, p = .039$. Thus, there is significant evidence to reject the null hypothesis and conclude there is a significant difference in fifth grade male students’ MCT2 percentage of questions answered correctly in reading comprehension in Language Arts. Furthermore, the actual difference in the mean scores between groups was moderate based on Cohen's (1988) conventions for interpreting effect size. Table 35 shows a summary of fifth grade male student percentages using a one-way ANOVA.

**Null Hypothesis 2-11.** There is no significant difference in fifth grade male students’ MCT2 percentage of questions answered correctly in writing in Language Arts based on the type of classroom (single gender vs. mixed gender).
Table 36

One-way ANOVA for Fifth Grade Overall Percent Correct in Writing

ANOVA

<table>
<thead>
<tr>
<th></th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Groups</td>
<td>.159</td>
<td>1</td>
<td>.159</td>
<td>4.449</td>
<td>.038</td>
</tr>
<tr>
<td>Within Groups</td>
<td>2.743</td>
<td>77</td>
<td>.036</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>2.902</td>
<td>78</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Overall for fifth grade, the one-way ANOVA was significant, $F(1, 77) = 4.449, p = .038$. Thus, there is significant evidence to reject the null hypothesis and conclude there is a significant difference in fifth grade male students’ MCT2 percentage of questions answered correctly in writing in Language Arts. Furthermore, the actual difference in the mean scores between groups was moderate based on Cohen's (1988) conventions for interpreting effect size. Table 36 shows a summary of fifth grade male student percentages using a one-way ANOVA.

Null Hypothesis 2-12. There is no significant difference in fifth grade male students’ MCT2 percentage of questions answered correctly in reading comprehension in Language Arts based on the type of classroom (single gender vs. mixed gender).
Table 37

*One-way ANOVA for Fifth Grade Overall Percent Correct in Grammar*

<table>
<thead>
<tr>
<th>ANOVA</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Groups</td>
<td>.029</td>
<td>1</td>
<td>.029</td>
<td>.649</td>
<td>.423</td>
</tr>
<tr>
<td>Within Groups</td>
<td>3.418</td>
<td>77</td>
<td>.044</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>3.447</td>
<td>78</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Overall for fifth grade, the one-way ANOVA was not significant, \( F (1, 77) = .649, p = .423 \). Thus, there is not significant evidence to reject the null hypothesis and conclude there is a significant difference in fifth grade male students’ MCT2 percentage of questions answered correctly in grammar in Language Arts. Furthermore, the actual difference in the mean scores between groups was quite small based on Cohen's (1988) conventions for interpreting effect size. Table 37 shows a summary of fifth grade male student percentages using a one-way ANOVA.

**Summary**

The findings sought to address the research questions and hypotheses in terms of the effect of classroom arrangement (single-gender versus mixed-gender) on the achievement of males in Language Arts on the Mississippi Curriculum Test, Version 2 (MCT2). All of the questions and hypotheses were addressed using a one-way ANOVA. Descriptive statistics were used for analysis of the scale scores of males in single-gender classes and males in mixed-gender classes in grades three, four, and five at the school. Descriptive statistics were also used for analysis of the average percent correct in vocabulary, reading comprehension, writing, and
grammar of males in single-gender classes and males in mixed-gender classes in grades three, four, and five at the school. There was not a significant difference between the average scale scores on the Mississippi Curriculum Test, Version 2 (MCT2) of third and fourth grade males in single-gender classes compared to third and fourth grade males in mixed-gender classes; however, there was a significant effect of single-gender education on the fifth grade scale scores on the Mississippi Curriculum Test, Version 2 (MCT2) (Table 25). Furthermore, there was not a significant difference between overall average percent correct in vocabulary, reading comprehension, writing, and grammar on the Mississippi Curriculum Test, Version 2 (MCT2) of third and fourth grade males in single-gender classes compared to third, fourth, and fifth grade males in mixed-gender classes. Also, fifth grade overall average percent correct in vocabulary and grammar were not significant. However, the fifth grade overall average percent correct in reading comprehension and writing were significant (Table 35, Table 36). The results provided show there was not a significant difference in the overall scale scores and the average percent correct for third and fourth grade students on the fact that the significance levels of those two grades were greater than the set level of 0.05; on the other hand, the results do show there was a significant difference in the overall scale scores and the average percent correct in reading comprehension and writing for fifth grade. Therefore, the conclusion can be drawn that the achievement of males in Language Arts is not affected in a single-gender classroom any more than it would be in a mixed-gender classroom for third and fourth grade; for fifth grade, the conclusion can be drawn that the achievement of males in Language Arts is somewhat affected by single-gender education. The findings for third and fourth grade seem to correlate with a meta-analysis study recently conducted by Pahlke, Hyde, and Allison (2014) that represented 1.6 million students in K-12 from 21 different nations. They concluded that the studies they
conducted that were high quality yielded no evidence to prove single-gender education was more beneficial than mixed-gender education.
CHAPTER FIVE: DISCUSSION

Chapter Four presented the results of the study, as well as the data analysis concerning the impact of single-gender education on male student achievement in grades three through five in English Language Arts. It also presented the findings of how male students performed in the sub-categories of vocabulary, reading comprehension, writing, and grammar. A one-way ANOVA was used to compare if there was any significant impact on achievement in English Language Arts of males in single-gender classes compared to males in mixed-gender classes. A one-way ANOVA was also utilized to compare the percentage of questions answered correctly on vocabulary, reading comprehension, writing, and grammar of males in single-gender classes compared to males in mixed-gender classes.

The purpose of Chapter Five is to further analyze the results of the study, discuss its limitations and implications, and provide further recommendations for research. The chapter contains five sections: a summary of the findings, a discussion of the findings, the limitations of the study, the implications of the study, and the recommendations for future research.

**Summary of Findings**

The achievement gap between males and females continues to be an area of concern for schools across the country. Schools have relied on traditional methods of delivering instruction, especially in terms of a one-size-fits all approach. While teaching to the middle has allowed most schools to veil underlying issues, the research supports the idea that male achievement in Language Arts is not where it needs to be. Therefore, the study sought to analyze if organizing elementary school males in single-gender classes would affect their achievement in Language Arts.
The purpose of the study was to determine if single-gender education had an impact on the Language Arts achievement of males in mixed-gender classes compared to males in single-gender classes; however, the by-product of the study was that educators within the school were equipped with the knowledge and tools of brain-based learning. Additionally, the study sought to analyze the impact single-gender education has on elementary males’ achievement in vocabulary, reading comprehension, writing, and grammar for males in single-gender classes compared to males in mixed-gender classes.

**Research Question 1: Overall Scale Scores in Language Arts**

The major goal of the research study was to determine the impact of single-gender education on elementary male student achievement in the area of Language Arts. While a much larger scope involving many districts, schools, classrooms, and individual students would have been ideal, the researcher was limited to one school within the state due to access and time restraints. By using the available sample and a very reliable and valid research instrument used by the state department, the researcher sought to provide educators an overview of single-gender education and its impact on male student achievement.

The sample of the study consisted of 222 students, 122 males in mixed-gender class and 100 males in single-gender classes. The participants of the study comprise 51% of the entire school population; the other 49% of the students are female students. While the males in mixed-gender and single-gender classes was not balanced resulting in a less than ideal research design, the researcher had to follow state and federal guidelines concerning placement of students in single-gender classes. However, all of the participants were given the same state assessment, the Mississippi Curriculum Test, Version 2 (MCT2), during the spring of the 2011-2012 school year.
The results of the one-way ANOVA indicated that a significant difference did not exist in the overall scale scores in Language Arts of males in third and fourth grade single-gender classes compared to males in mixed-gender classes; however, there was a significant difference in the overall scale scores in Language Arts of males in fifth grade single-gender classes. The significance level for third grade was .755, and it was .468 for fourth grade. The significance level for fifth grade was .046, with a moderate effect size of .05. The null hypothesis was accepted for third and fourth grade for Research Question 1, stating there was not a statistically significant difference in grades three and four male students’ MCT2 scale scores in Language Arts in single-gender classrooms. In contrast, the null hypothesis was rejected for fifth grade for Research Question 1, stating there was not a statistically significant difference in grade five male students' MCT2 scale scores in Language Arts in single-gender classrooms.

Research Question 2: Percentage Correct in Vocabulary, Reading Comprehension, Writing, and Grammar

For the second research question, the researcher aimed to examine if there was a statistically significant difference in the overall percent correct of questions in vocabulary, reading comprehension, writing, and grammar for males in single-gender classes compared to males in mixed-gender classes. Even though this was not the primary goal of the study, the researcher wanted to determine if single-gender education had any positive influence on male achievement in the sub-components of Language Arts (vocabulary, reading comprehension, writing, and grammar). The sample for this part of the study consisted of the same number of participants as the first research question. Again, the disparity between the number of males in single-gender classes and males in mixed-gender classes is due to the fact that single-gender education is not mandatory, and placement in those classes is based on parental requests.
The results of the one-way ANOVA that was conducted to analyze the overall percentage of questions answered correctly for third, fourth, and fifth grade in vocabulary did not show a significant difference for males in single-gender classes compared to males in mixed gender classes with $F (1, 63) = .335, p = .565$ for third grade, $F (1, 76) = .002, p = .963$ for fourth grade, and $F (1, 77) = 3.372, p = .070$ for fifth grade. The one-way ANOVA for the overall percentage of questions answered correctly in reading comprehension did not show a significant difference for males in third and fourth single-gender classes compared to males in mixed-gender classes with $F (1, 63) = .005, p = .944$ for third grade and $F (1, 76) = .025, p = .874$ for fourth grade. However, the one-way ANOVA for the overall percentage of questions answered correctly in reading comprehension did show a significant difference for males in fifth grade single-gender classes with $F (1, 77) = 4.426, p = .039$ for fifth grade. The one-way ANOVA for the overall percentage of questions answered correctly in writing did not show a significant difference for males in third and fourth grade single-gender classes compared to males in mixed-gender classes with $F (1, 63) = .418, p = .520$ for third grade and $F (1, 76) = 2.589, p = .112$ for fourth grade. However, the one-way ANOVA for the overall percentage of questions answered correctly in writing did show a significant difference for males in fifth grade single-gender classes with $F (1, 77) = 4.449, p = .038$ for fifth grade. Finally, the one-way ANOVA for the overall percentage of questions answered correctly for grades three, four, and five in grammar did not show a significant difference for males in single-gender classes compared to males in mixed-gender classes with $F (1, 63) = .105, p = .747$ for third grade, $F (1, 76) = .120, p = .730$ for fourth grade, and $F (1, 77) = .649, p = .423$ for fifth grade. Based upon the data collected and the analysis of the results, the null hypotheses for Research Question 2 were accepted for third, fourth, and fifth grade vocabulary and grammar. However, the null hypotheses were rejected for fifth grade
The purpose of this study was to determine if there is a statistically significant different in the overall achievement of males in Language Arts in single-gender classes compared to males in mixed-gender classes. The data from the study highlights the fact that single-gender education is not significantly better than mixed-gender education for third and fourth grade in terms of improving male student achievement, but it did not prove that it was injurious either. However, it did highlight the impact of single-gender education on fifth grade scale scores, reading comprehension, and writing. Additional research and study is needed to determine the overall effectiveness of single-gender education for multiple grade levels.

The results of the study still do not squelch the debate about the impact of single-gender education on student achievement. In fact, the results show that for the most part, males in single-gender education had higher scale scores and more questions answered correctly, just not significant in terms of the research study for third and fourth grade. This supports studies championing the effect of single-gender education on student achievement (Mulholland, Hansen, and Kaminski, 2004; Hutchison & Mikulski, 2012). Yet, the results of the study in terms of significant differences for third and fourth grade still fall in line with recent studies showing single-gender education did not significantly impact the overall achievement of males in Language Arts (Halpern et al., 2011; Hattie, 2009; Cable & Spradlin, 2008). The conflicting results from these studies show that the debate will continue, or at the very least, additional
research will be conducted to see if there are any other factors of single-gender education that lead to student achievement.

It is promising that the results of the study showed marginal positive effects of single-gender education on student achievement, and even more promising is the fact that none of the results show any harmful or negative effects in terms of student achievement. It is also promising that fifth grade had significant effects in the areas of reading comprehension and writing. While the results were not significant for third and fourth grade, it can be said that they were not detrimental to the students involved in single-gender classes. As stated earlier, even without finding statistically significant evidence to support single-gender education for third and fourth grade, all teachers within the school are now equipped with the tools and the knowledge to teach to the gender based on how the brain learns. Further research could be conducted to determine which strategies worked best for fifth grade and their impact on student achievement.

While this research study did not involve many districts or schools across many states, it does provide a snapshot of the impact of single-gender education on an urban, low socioeconomic area. It also adds to the limited research of how single-gender education affects males in the area of Language Arts. From perusing through the research studies, the researcher found this study to be the only kind conducted in Mississippi.

**Limitations**

Due to the nature of the study, there are several limitations to the study that threaten the internal and external validity of the results. Limitations related to internal validity components such as random assignment, testing, experimental mortality, compensatory rivalry are mentioned below. Limitations related to external validity components such as population validity, the novelty effect, and experimenter bias are also mentioned below.
One threat to internal validity involves the lack of random assignment of the students in single-gender classes and mixed-gender classes. The single-gender classes offered at the school are optional; federal law prohibits offering single-gender classes without offering mixed-gender classes as well. With parents enrolling students into the single-gender classes by choice, it leaves a disparity in the sample. The single-gender classes have fewer students than the mixed-gender classes. Randomization could not be utilized because parents were given the option of whether or not to enroll in the single-gender classes; this limits matching between the students in the single-gender classes compared to the mixed-gender classes. Therefore, the selection component is a threat to internal validity for this study because the groups were not equivalent when the study began, and they were not equivalent at the end of the study. In turn, allowing parents to opt-in or make a request for their child to be in a single-gender classroom limits the researcher’s ability to control for achievement level of students in those classes. One of the requirements of having single-gender classes in a co-educational school is that parents have to opt-in or request to have their child placed in a single-gender classroom; this also allows parents the choice to opt-out of the program (NASSPE, n. d.). This ability to opt-in or opt-out of the classes limits the researcher’s ability to have a consistent population throughout the length of the study.

Another threat to internal validity would be testing, especially for fourth and fifth grade students in the study. What this means is that students in fourth and fifth grade have become what Gall et al. (2007) call “test-wise” when it comes to the Mississippi Curriculum Test, Version 2 (MCT2). Both the fourth and fifth grade males in single-gender classes and mixed-gender classes took the MCT2 in previous grades. Fourth graders took the MCT2 in third grade, and fifth grade took the MCT2 in third grade and fourth grade. Therefore, fourth grade has
already been exposed to the format of the test once and fifth grade twice. It could be possible that students in fourth and fifth grade performed better on the MCT2 because of their experience with it (Gall et al., 2007). Since the MCT2 starts in third grade, the third grade students for this study did not know the format of the test.

There is also an internal threat to validity based on experimental mortality. As mentioned earlier, when parents have the choice to opt-in or opt-out of the program the number of students enrolled in single-gender classes in August is not the same as the number of students enrolled in single-gender education when the MCT2 is given in May. Not only would the loss of students affect the study, but some of the students could have been absent on the day of the MCT2, meaning a smaller number of participants for the study (Gall et al., 2007). Random assignment would help alleviate this threat, but this was not an option due to the fact that there must be an opportunity for parents to opt-out of the program at any time (NASSPE, n. d.).

Compensatory rivalry is an extraneous variable sometimes known as the *John Henry effect* (Saretsky, 1972). The data gathered were from the 2011-2012 school year, the first year of single-gender education as Longview Elementary School. It could be perceived by males in mixed-gender classes that they were in competition with males from single-gender classes. This could provide an extra motivation to those males in mixed-gender classes.

A final threat to the internal validity of the study is the resentful demoralization of the control group. As mentioned before, this was the first year single-gender classes were a part of the school’s instructional program. It was also the only school in the school district to have single-gender classes. This caused the single-gender classes to receive a great deal of attention from the district leaders, the media, and the community. Males in the mixed-gender classes could have perceived preferential treatment for males in single-gender classes because of the
attention they were garnering; this could have a negative effect on the performance of males in mixed-gender classes on the assessment (Gall et al., 2007).

One threat to the external validity of the study involves population validity, or the ability to generalize the results to a larger group of students than the 222 involved in the study (Gall et al., 2007). The setting of the school in an urban, low socioeconomic area of Northeast Mississippi might not produce the same results for schools in larger, more suburban parts of the United States. For one reason, Mississippi has its own curriculum compared to other states. It would also be difficult to generalize the results to other grade levels because of the difference in the curriculum and the difference in the assessment.

It is also plausible that the novelty effect, a component of ecological validity, played a role in the results (Gall et al., 2007). Even though the curriculum taught in both types of learning arrangements was the same, and even though teachers in both types of classrooms received single-gender training, it is feasible to believe some aspects of the instruction within the single-gender classroom might be different than the type of instruction in the mixed-gender classroom. However, in terms of the overall results, it would appear this effect is small or even null.

A final possible threat to external validity would be experimenter bias (Gall et al., 2007). This is where the overall competence of the teacher and how he or she utilized the single-gender teaching strategies in either a mixed-gender classroom or a single-gender classroom would come into play. However, one way the researcher minimized the effects of this was by exposing all of the teaching staff to professional development related to effective teaching strategies for male students.
Implications

In terms of a methodological implication, the study began as an endeavor to explore the impact of single-gender education not only on the achievement of males, but also male achievement based on socioeconomic status and ethnicity. After careful analysis of how including all of these variables would impact the study, it became evident to the researcher that the inclusion of socioeconomic status and ethnicity would complicate the research instead of adding to it. Complications of matching based on socioeconomic status and ethnicity would be almost impossible because of the opt-in and opt-out aspect of single-gender education as defined by the United States Department of Education (NASSPE, n. d.). Therefore, the research questions and the statistical analysis were modified to give a more general overview of single-gender education on male achievement instead of a more detailed analysis of sub-groups of males.

Another methodological implication of the study was the use of ANOVA instead of a t-test. The researcher’s first instinct was to use a t-test because of its ease of use. However, after realizing multiple t-tests would have to be implemented to produce the same results as only one implementation of the ANOVA statistical analysis, the researcher came to the conclusion ANOVA would be more efficient. It would also limit the chances of committing a Type I error (Gall et al., 2007). ANOVA was also most useful in terms of the variables involved in the study (males in single-gender classes and males in mixed-gender classes). However, if socioeconomic status and ethnicity had been added to the study, ANCOVA would have been more effective because of its ability to match groups on variables such as socioeconomic status and ethnicity after the study is over (Gall et al., 2007). In addition to whether or not ANCOVA would be more effective, the researcher also considered the use of MANOVA, or Multivariate Analysis of
Variance. Similar to ANOVA in the fact it is a comparison of means, MANOVA also utilizes several treatments or independent variables. However, the difference is MANOVA focuses on more than one dependent variable and the interaction between those dependent variables (Gall, Gall, & Borg, 2007). With the achievement scores of males being the single dependent variable for the study, the researcher determined ANOVA was a more logical choice.

As far as practical implications are concerned, the study did little to support the notion that single-gender education has a significant impact on male student achievement (Friend, 2006) for third and fourth grade. However, the single-gender males in fifth grade did have significant results in terms of scale scores, reading comprehension, and writing. For the researcher, it would be interesting to know what, if anything, teachers in those classrooms did differently than teachers of single-gender classes in third and fourth grade. It would be hard to assume anything without classes being matched based on achievement level. However, the study could have some practical implications for teachers in general, whether it is a teacher who teaches males in a single-gender class or a teacher who teaches males in a mixed-gender class. One of the by-products of the study not mentioned before is that the school, as a whole, showed gains in Language Arts on the MCT2 the year the study was conducted. While it would not be plausible to state that single-gender education was the main cause for the gains, it would be plausible to state that it did have some impact. One of the most notable aspects of the study is that all teachers within the school (teachers in single-gender classes and teachers in mixed-gender classes) received training on how males and females learn. Teachers received professional development about how brain-based learning impacts teaching strategies used within the classroom (Jensen, 1998; Sousa, 2006). They also received training on the implications of using the Theory of Multiple Intelligences within the classroom, and how using strategies related to
multiple intelligences can enhance the curriculum in a single-gender classroom and a mixed-gender classroom (Gardner, 1983).

**Recommendations for Future Research**

While the study revealed there were no significant differences in the overall scale scores or overall percent correct of males in single-gender classes compared to males in mixed-gender classes for third and fourth grade, there are a few points that could be addressed in future studies. First, the issue of gender could be analyzed from the viewpoint of the impact of single-gender education on males in single-gender classes compared to females in single-gender classes. For future researchers, this would involve understanding the importance of brain-based learning (Jensen, 1998; Sousa, 2006). For instance, if teachers who taught males and females in single-gender classes all had the same type of training related to how the brain learns, what would the impact be on the achievement of those students? What would each type of room look like? What strategies are more beneficial for males? For females? For example, future studies might examine the impact of allowing males to pick their own books, write more about action within a story, and engage in competition within the classroom (James, 2007). Furthermore, the study could compile trend data of those students over a three-year period to see if there is growth for males and females in those classes each year.

Future studies could also take on more of a qualitative stance by studying what type of teacher is a best fit for teaching single-gender classes. Ferrara (2009 & 2012) has developed a template to use to match teacher and student as it relates to single-gender education. Her studies focus more on the preference and style of the teacher, but future studies might include the preference and style of the student (Ferrara, 2009). Case studies could be conducted to document the pros and cons of single-gender education through the eyes of the student. This
information could lead to the sustenance or the need for transformation of single-gender education.

One obvious study that comes to mind would be to look at other subject areas in terms of how males in single-gender classes compare to males in mixed-gender classes. Two examples of subjects that would warrant further analysis would be math and science. Even though Pahlke, Hyde, and Allison (2014) conducted a meta-analysis which found minimal effects of single-gender education on achievement of males and females in the areas of math and science, it would be worth analyzing the long-term data of a cohort of males and females who are in single-gender classes for the duration of their K-12 education. Another aspect of using math and science as a focus of future studies involves the population of this study. All students in grades three through five take the Mississippi Curriculum Test, Version 2 (MCT2) in math just like they do in Language Arts. Furthermore, the fifth grade classes take the state science test. Gauging the success of males in single-gender classes compared to males in mixed-gender classes through the lens of math and science would allow future researchers to notate what teaching strategies proved to be successful in the achievement of males in math and science.

One interesting facet of the current study would be to see if there are long-term effects of single-gender education on the students involved in the study. Would the achievement gap between males in single-gender classes and males in mixed-gender classes grow, stay stagnant, or decrease? Would the males involved in the study close the achievement gap with females in Language Arts? According to James (2009), the way males and females process information does have implications for teachers within the classroom. It is the teacher who understands this who is more apt to use this information to help close the achievement gap.
Another aspect of the study that was explored in the beginning stages was to focus more on sub-groups and their achievement levels. Of the participants involved in the study, further research could be analyzed to determine the achievement of males based on their ethnicity, their socioeconomic status, gifted males, special education males, and migrant males. The results of such a study would create more avenues to explore in terms of the effect of single-gender education on the achievement level of males in Language Arts.

Finally, further studies could explore this topic by matching the sample of males in single-gender classes to males in mixed-gender classes. For example, students could be matched based on socioeconomic status, current achievement level, and race. Matching could possibly give a more accurate depiction of which group achieves more over the course of a year.

**Conclusion**

The results of the study did not reveal a significant impact on male student achievement when students are in a single-gender learning environment compared to a mixed-gender learning environment for third and fourth grade; however, the study did reveal a significant impact of single-gender education on fifth grade scale scores, reading comprehension, and writing. As mentioned throughout the synthesis and analysis of the study, even though there was not a statistically significant impact on male student achievement for third and fourth grade, all teachers are now equipped with brain-based learning strategies to aid in the instruction of both male and female students regardless of the learning arrangement. Future research involving a longitudinal study of the effects of student exposure to brain-based learning strategies and their impact on closing the achievement gap between males and females could possible add insight for the educational community.
As a result of the study, the researcher learned that some of the current educational materials support the use of single-gender education, but there is still a multitude of research that does not. However, one key notion is supported by both opponents and proponents, additional research is needed to understand the overall impact of single-gender education on the achievement of males in Language Arts.

The researcher for the study was only able to shine a spotlight on one school in one part of Mississippi; additional research is needed to analyze what type of effect single-gender education might have on different races with different socioeconomic statuses throughout the state. While single-gender education might not be the answer to the educational plight for many of the students across the state, the researcher provides a toolbox for teachers to utilize to address brain-based learning techniques.

As a result of the study, the researcher hopes to provide the information garnered to administration in the district and throughout the state. The hope of the researcher is not to suggest single-gender education is what is needed to close the achievement gap, but to provide the administration with the knowledge of how students learn in hopes they will, in turn, reflect upon current educational practices.

Finally, it has been reported that almost eight million students in grades four through twelve have poor literacy skills (Christie, 2007). With that being said, the research on how single-gender education impacts the literacy of students is still up in the air, but it could be seen as one slice of the pie in meeting the needs of students (Hubbard and Datnow, 2005). While further research and investigation is necessary before a solid conclusion can be drawn about the effect of single-gender education on male students in public school settings, it is worth noting as
Lee and Bryk (1986) did over twenty-five years ago, that additional research into single-gender education is warranted.
REFERENCES


doi:10.1080/18146627.2011.618721


Retrieved from Education Research Complete database.


doi:10.1080/03057640902903722.
Shapka, J. D., & Keating, D. P. (2003). Effects of a girls only curriculum during 
adolescence: Performance, persistence, and engagement in mathematics and 

September 13, 2012 from HighBeam Research: http://www.highbeam.com/doc/1P3-
42247833.html


Smith, M. K. (2002). *Jerome S. Bruner and the process of education, the encyclopedia of 
informal education.* Retrieved June 6, 2013, from http://infed.org/mobi/jerome-bruner-
and-the-process-of-education/

shortages and boys’ reading achievement. *Sex Roles, 56*(9-10), 651-659. 
doi:http://dx.doi.org/10.1007/s11199-007-9206-4

from http://search.proquest.com/docview/216039149?accountid=12085


South Carolina Department of Education. (2009). *Recommended components for single-gender 
programs.* Retrieved from http://ed.sc.gov/agency/se/School-
Transformation/documents/RecommendedComponentsforSGPrograms.pdf


187


APPENDIX

Appendix A: Institutional Review Board Approval

LIBERTY UNIVERSITY
INSTITUTIONAL REVIEW BOARD

January 7, 2014

Brock W. English
IRB Application 1759. Single Gender Reading and Writing Classes and the Impact on Males

Dear Brock,

The Liberty University Institutional Review Board has reviewed your application in accordance with the Office for Human Research Protections (OHRP) and Food and Drug Administration (FDA) regulations and finds your study does not classify as human subjects research. This means you may begin your research with the data safeguarding methods mentioned in your approved application.

Your study does not classify as human subjects research because your study involves deidentified archived data.

Please note that this decision only applies to your current research application, and that any changes to your protocol must be reported to the Liberty IRB for verification of continued non-human subjects research status. You may report these changes by submitting a new application to the IRB and referencing the above IRB Application number.

If you have any questions about this determination, or need assistance in identifying whether possible changes to your protocol would change your application’s status, please email us at irb@liberty.edu.

Sincerely,

Fernando Garzon, Psy.D.
Professor, IRB Chair
Counseling

(434) 592-4054

LIBERTY UNIVERSITY

Liberty University | Training Champions for Christ since 1971
Appendix B: Instrument

The Mississippi Curriculum Test, Version 2 (MCT2), a criterion-referenced, standardized test, is the preferred measurement to use for collecting data about the cause-and-effect relationship in this study. It is a measure of student achievement in Language Arts and Mathematics in grades three through eight based on the Mississippi Curriculum Framework. It is the basis for state accountability and is designed to meet the federal requirements of the No Child Left Behind Act of 2001. It contains test questions of varying degrees of difficulty that are aligned to the content, skills, and processes represented by Mississippi’s academic content standards as specified in the state curriculum frameworks and the academic performance level descriptors (Office of Student Assessment, 2011).