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A Case Study of Single-Sex Biology Classes in a High School in South Georgia

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A CASE STUDY OF SINGLE-SEX BIOLOGY CLASSES IN A HIGH SCHOOL IN SOUTH GEORGIA

by

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(Under the Direction of Dr. Paul Brinson)

ABSTRACT

The research on single-sex classrooms, especially in high schools, is at best, sparse. Settings and findings vary so dramatically from one area to another that correlating studies is difficult. However, with the advent of No Child Left Behind (2001), schools have been given the opportunity to explore new and creative ways to increase student achievement. Single-sex classrooms are one of the ways schools across the country are attempting to meet the criteria of NCLB. Some single-sex studies have shown that female students improve test scores in areas that are generally thought of as male-dominated areas, such as math and science; that females feel safer in participating in classes with males absent and opportunities to participate are increased; differences in learning styles can be used to an advantage in single-sex classes; and distractions in the classroom caused by the opposite sex are diminished.

This research was conducted in a high school in South Georgia where the biology End-of-Course Tests (EOCTs) for single-sex and coeducational classes were examined. Student questionnaires were also given to the students in these classes. The questionnaires had questions divided into five scales: emotional security, self-efficacy, peer help, participation, and interest in biology. The two teachers who taught the biology classes and the administrator in charge of the classes were interviewed at the conclusion

of the semester studied. Each set of data was analyzed for any significant differences between sex, setting, and sex by setting interaction for each scale as well as the EOCTs.

This researcher found that in this study there were no differences between the EOCT scores for sex, setting, or sex by setting interaction. However, there were differences found within certain scales in the questionnaire, some favoring coeducational classes and some favoring single-sex classes. The teacher and administrator interviews showed a tendency to favor single-sex classes inasmuch that the teachers believe they affect student achievement by building stronger relationships in single-sex classes, as well as relieving distractions help those who need it the most. The analysis of these tendencies may provide other administrators strategies they could use in implementing single-sex education in their own schools.

INDEX WORDS: Single-sex, Coeducation, Student achievement, Self-efficacy, Peer help, Participation, Interest, Emotional security, Biology, Student achievement, EOCT, CRCT

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DEDICATION

I would like to dedicate this dissertation to my two children, Alexis and Bryce. Seeing them grow over the years makes me realize that they are not only the most important thing in my life, but that they are also a part of me. Without the energy that they give me daily (as well as the suggestions to improve this document), I would not have been able to complete this work.

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CHAPTER 1

INTRODUCTION

In an era of increased school accountability, such as No Child Left Behind Act of 2001 (NCLB; US Department of Education, 2009), and other major school issues which include social reforms, economic instability, furloughs, and staff attrition, it is imperative educators find and use any and all ethical ways to promote student achievement. Even though single-sex schooling was not considered unusual in American educational history (Friend, 2006), the Title IX legislation in 1972 (US Department of Education, 2009), which was designed to eliminate discrimination based on sex in any educational program receiving federal funds, limited the amount of flexibility used in sorting students by sex into separate classrooms (McDowell, 2008). However, NCLB revived the once dormant concept. With the increased federal accountability factors given to schools, administrators were given the leeway, under certain conditions, to once again use single-sex classes, outside of the normal sex education and physical education classrooms, to attempt to positively affect student achievement (Ayres, 2006).

Single-sex classrooms are not only an academic venture, but also a political one. While many groups believe single-sex classes offer support to certain populations needed to ensure academic success (Cable & Spradlin, 2008; Cooper, 2006; Gurian, Stevens, & Daniels, 2009; Mead, 2008), others believe these classes are a step backward toward an inaccurate separate but equal concept once used for racial segregation (Hughes, 2006). One example of the political turmoil surrounding single-sex classes can be seen in the American Association of University Women (AAUW). When NCLB first allowed single-sex classes to be reinstituted, the AAUW was fully behind the movement. Within

two years, however, possibly from pressure from other organizations, the AAUW changed their stance to one of disapproval (Spielhagen, 2006). There are few groups with national clout that believe single-sex classes are a type of classroom that should be used in primary and secondary education; however, there are other organizations, such as the National Association of Single-Sex Public Education (NASSPE), founded in 2005 and led by physician-psychologist Leonard Sax, that believe single-sex education is a viable option for groups of children in certain socioeconomic and ethnic categories. Part of the NASSPE's motto includes the statement "because girls are so diverse and boys are so diverse, single-sex schools offer unique educational opportunities for girls, and for boys" (Sax, Introduction, para. 7, 2010). Spielhagen (2007) reiterated this idea when he stated "although it is difficult to attribute effectiveness and positive results to any one factor, specifically the segregation of students by their sex, single-sex arrangements can be examined and the results evaluated to get a greater sense of whether such arrangements are worthwhile" (p. 4). Since Georgia ranks extremely low in overall educational achievement in the United States, educators are willing to try any and all ethical means to improve student achievement (Seiler, Ewalt, Alexander, Olds, & Young, 2009).

Single-sex classes involve a multitude of variations, along with a multitude of ways to assess their effectiveness. For this research project, the assessment and analysis of the single-sex classes were limited in scope to a few socioeconomic and ethnic categories, Georgia End-of Course tests (EOCTs) as mandated by adequate yearly progress (AYP) through NCLB, Criterion Referenced Competency Tests (CRCTs) and student/teacher/administrator perceptions. The effectiveness of the program was based

on quantitative and qualitative data concerning beliefs from students, teachers and administrators about why the classes were or were not successful.

Background

The American education system has been replete with single-sex classes, even though it was a separate and not equal curriculum for males and females for a large part of American history (Friend, 2006; Spielhagen, 2008). However, the enactment of Title IX in the early 1970s all but destroyed single-sex education. Even though the legislators did not specifically outlaw classes based on gender, most schools did not venture into this arena because of the rules and regulations of the act. With the advent of the No Child Left Behind Act (NCLB) in 2001, single-sex education may be poised for a comeback. Few can argue that an achievement gap does not exist between males and females in many core subjects, and there is little debate that some studies have shown an inclination to close the gender achievement gap in many areas through the use of single-sex education.

History of Single-Sex Education.

Single-sex education covers many educational settings, such as physical educational and sex education classes. However, the majority of these classes are in either private or parochial schools (Weil, 2008). Interestingly the trend toward coeducational classrooms did not occur until well into the 19th century (Cable and Spradlin, 2008) when the idea was opened to *all* areas of education for both sexes as opposed to teaching males for certain careers and females for others (Cuizon, 2008; Spielhagen, 2006). Title IX in the early 1970s, however, changed the single-sex option for classes for over three decades. Title IX legislation "prohibits discrimination on the

basis of gender or race in any educational program receiving federal funds" (Friend, 2006, p. 3). To further the restriction of single-sex classes, the Department of Health, Education, and Welfare issued more regulations that significantly reduced the use of single-sex classes as well (Hughes, 2006). However, NCLB has allowed parents, schools, and systems the opportunity to once again use single-sex classes as an alternative setting for their students. According to the Center for Evaluation and Education Policy (CEEP), NCLB allowed public schools to use federal funds to experiment with new programs, one of which is single-sex education (Cable & Spradlin, 2008).

Since NCLB has opened the opportunity for single-sex classes to be used, the classes seem ready to reappear in a large number of schools. In fact, over 300 schools today use single-sex classes in some fashion, compared to fewer than three in 1995 (Ayres, 2006). In 2006, the federal government released its guidelines for the appropriate use of single-sex classes (Sneed & Anderson, 2009). However, with single-sex classes being a relatively new venture in the American education system, there is a crucial lack of data available regarding to single-sex education and student achievement (Mael, Alonso, Gibson, Rogers, & Smith 2005). Mael, et al (2005) general findings show that single-sex schooling either had a somewhat positive or null effect on student achievement and that there must be more data to show a statistical significance of these findings. Each school or district, though, must be sure to follow all NCLB guidelines in order to transition smoothly in the implementation of single-sex classes (Cable & Spradlin, 2008; Sneed & Anderson, 2009).

Positives and Negatives of Single Sex Education.

When discussing the positive and negative issues of single-sex education, I will be careful not to show stereotypes as traits, or have one group seeing one trait as positive and another as negative. However, one cannot sensibly argue that there are not achievement gaps between male and female learners (Rex & Chadwell, 2009). In light of this issue, I will base all positives and negatives on research-proven pedagogical characteristics.

Males and females are physiologically different. Even though this statement seems basic and elementary, many educators and educational systems do not treat male and female learners differently. Hughes (2006) reports that the physiological differences between male and females required different teaching strategies at different times in the learning process, and Sax (2007) stated that requiring these students to learn at a pace at which they are not developmentally ready is unfair to the student. However, not all scientists argue that physiological differences are wide enough to encourage single-sex classes. In fact, some argue that the differences *within* the sex are broader than *between* the sexes (Mead, 2008; Cable & Spradlin, 2008), and that single-sex classes could possibly lead to larger social issues in the years to come (Tsolidis & Dobson, 2006).

Learning styles are another area in which males and females are different and could possibly benefit from separate educational settings. Males and females are neurologically different enough to impose different learning styles (Ryan, 2009; Logan, 2007). Competition is one area in which the differences could affect learning (Cable & Spradlin, 2008; Ferrara, 2006; Rogers, 2008), and collaboration another (Hughes, 2006, Rogers, 2008). There are other differences as well. The argument of neurological

differences, therefore, is not based on difference of learning styles, but in how the learning styles can best be used in the classroom; therefore, single-sex classes are designed to incorporate these differences in teaching strategies to promote academic achievement. As stated previously, though, more data is needed.

Single-sex classes could theoretically promote the areas of equal opportunity and participation in the classroom as well (Hughes, 2006; Jerome, Rozsa, Bane, Klise, and Clark, 2006). One theory indicates boys are generally more aggressive and require more teacher attention, thus taking learning opportunities from girls in the classroom (Hughes, 2006). Separating the sexes can invite more classroom opportunities to participate in discussion and other activities, such as group work and lab exercises (Hoffman & Badgett, 2008; Rogers, 2008), not trying to impress the opposite sex (Herr and Arms, 2004), and a greater willingness to try new classroom activities, such as music and drama for the boys (Rex & Chadwell, 2009; Jorgensen and Pfeiler, 2008; Hughes, 2006). Kessels and Hannover (2008) found similar results in their study of self-concept of ability leading them to conclude that single-sex education helps adolescents gain a better concept of ability in school curriculum they might consider inappropriate for their own sex, thus promoting increases in self-concept and a subsequent concurrent increase in a willingness to ask questions, read aloud, participate in new activities, etc in class. However, the number of sound studies promoting these data is relatively few.

Social interactions (including discipline issues) in addition to male and female likes and dislikes are other areas in which some researchers promote the idea that single-sex education could affect achievement. Distractions caused by the opposite sex could hamper learning in the classroom (Ayres, 2006; Cable & Spradlin, 2008), and thus reduce

the enjoyment of the learning process (Logan, 2007). Limiting students' access to the opposite sex could promote learning and help enable teachers to handle emotional or intellectual issues when the opposite sex was not in the room (Gurian, Stevens, & Daniels, 2009; Weil, 2008; Spielhagen, 2006), thus reducing discipline referrals (Rex & Chadwell, 2009), though an increase in referrals in some cases could also occur (Dee, 2006). In fact, one researcher promotes the idea that boys need a buffer to learn, and unfortunately, the buffer sometimes turns out to be the girls (Ferrara, 2006). However, in some cases, as reported by Hoffman and Badgett (2008), separating the sexes sometimes caused one sex to think more highly of the other sex, creating classroom hindrances and promoting stereotypes; also some boys thought having girls in the classroom helped them learn more. Furthermore, single-sex separation is usually not found in real-world work situations (Logan, 2007) and could cause issues within the workplace in later years.

Testing and graduation rates are large issues concerning NCLB and AYP, and that is the case regarding single-sex classes as well. According to Dee (2006), girls outscore boys in reading and boys outscore girls in math and science on national assessments. Some studies have shown that single-sex classes could close the achievement gap in these areas (Cable & Spradlin, 2008; Gurian, et al. 2009; Flannery, 2006), though the data is limited. One study boasts a one hundred percent graduation rate for females at a single-sex female high school in Harlem (Cable & Spradlin, 2008). However, many of the studies showing academic improvement are from private schools (Mael, et al. 2005), have smaller student bodies, are experiments in single classes, or other institutional factors. Others (Friend, 2006; Outlaw 2006; Spielhagen, 2008) do not point to a rise in test scores for either males or females. Teaching differences within the classes could also

be one of the explanations for the change in test scores when they occur (Ferrara, 2006). However, the amount of sufficient data to draw conclusions is not readily present. Some researchers believe that even if testing does not show to be either positively or negatively affected by single-sex education, the social elements could be shown to be beneficial (Ayres, 2006).

One final aspect in consideration for the possible benefit of single-sex education is socioeconomic status. Both Cable and Spradlin (2008) and Tsolidis and Dobson (2007) agree that using single-sex classes in schools with high poverty rates can promote student achievement. If this is true, single-sex education could be used as a viable alternative to promote learning in these areas (Sax, 2010). However, as with other issues with single-sex, more studies must be done to corroborate these findings.

Summary.

Single-sex education has been and will remain a topic of hot debate. Although many agree that separating the sexes in certain classes or physical regions can prove beneficial, that are many others that fundamentally disagree with the notion altogether (Tsolidis & Dobson, 2006). Legislators' call to close the achievement gap between males and female subgroups can occur in a variety of areas and assuming that single-sex classes alone are what could promote achievement would be foolish (Kessels & Hannover, 2008). However, this notion does not mean that single-sex education should be abandoned, thus negating the option for this educational alternative. It simply implies that more studies must be conducted to assure both parents and educational professionals that single-sex classes are one of the many facets that could promote student achievement.

Statement of the Problem

The American education system included single-sex classes for the majority of American history. However, the landmark Title IX legislation in 1972 all but ended single-sex education in the United States. In 2001, the hiatus on single-sex education was lifted with the No Child Left Behind Act. However, it was not until five years later in 2006 when the Department of Education released its stipulations for using and evaluating single-sex classes in public schools. Since the protocol for these classes was released relatively recently, there is a large deficit in the amount of research pertaining to the viability of this educational initiative. Since there is a limited number of empirical studies supporting or negating the effects of single-sex classes, the intent of this concurrent mixed-methods study was to analyze the effectiveness of single-sex instruction on student achievement.

Research Questions

Adequate yearly progress as described by the No Child Left Behind Act mandates that schools meet annual measurable objectives in regard to student achievement; therefore, it is imperative for educators to find and use any and all ethical ways to promote student achievement. The purpose of this concurrent mixed-methods study was to analyze the effectiveness of single-sex instruction on student achievement. The following overarching research question served to guide this study: Is there a relationship between the type of class (single-sex or coeducational) and student achievement? In addition, the following sub questions will serve to further clarify the study:

1. Is there a difference in student achievement as measured by the End-of-Course Test in Biology between single-sex classrooms and coeducational classrooms, and does this achievement difference vary by student sex?
2. Is there a difference in self-efficacy, participation level, interest in class, emotional security, and peer help between single-sex classroom and coeducational classrooms, and do these differences vary by sex?
3. What are student, teacher, and administrator perceptions of the benefits and challenges of single-sex vs. coeducational classrooms?

Significance of the Study

Even though data-proven effective practices are used within the school used in this study, there still exist achievement differences not only among ethnic subgroups, but also between males and females within the school. As educators across the country search for viable ways to increase student achievement, single-sex classrooms are one such strategy being employed by an increasing number of school districts. Many educators believe that the use of single-sex classes will decrease the discipline and distractions inherent within coeducational classes, which will reduce the time used to handle these interruptions and as a result improve student achievement.

Single-sex education has been used throughout American history and was the predominant form of classroom organization for most of this time. However, the use of single-sex classes was all but annihilated by Title IX legislation in the early 1970s. With the introduction of the No Child Left Behind Act in 2001, single-sex classes emerged once again in the American school system. It was not until years later, though, that the government released its regulations for single-sex classes. Since single-sex classes are a

relatively new educational strategy in the United States, there is very limited research and data supporting or negating its effect on student behavior and achievement.

This study will provide valuable insights into the effect of single-sex classes on high school students, an area significantly lacking in the research regarding single-sex education. The data received from this study could also be used to influence master scheduling and classroom organization at the school at which the study is being conducted. Educators across the district, state, and nation could use the data from this study in correlation with the limited data already in existence to affect policy decisions regarding organizational designs of the classroom into single-sex classes. The use of single-sex classes may or may not prove to be a viable way to positively affect student achievement, but the possibilities of the strategy merit more research than currently exists.

Limitations

As with all research, this study has certain limitations. One limitation was that the classes are pre-existing 9th grade biology courses and are not a truly randomized sample of the population of the school. A second limitation of this study was that since the school used is a high school in South Georgia, the results may not be generalizable to schools in other parts or settings in the United States. Also, the size (approximately 1400 students) and demographics of this school will limit the study's replication as well as the fact that the study is limited to ninth graders. An additional limitation is that the pre-existing groups are not equivalent and cannot be disentangled. A final limitation was that in this school, an approximate attrition rate of five to ten percent due to withdrawals is expected during the semester of the study.

Delimitations

The study was delimited to first-time freshman biology students. There were no students who are taking biology for a second time allowed in these classes. Also, no pre-AP classes were used. Another delimitation set was the definition of student achievement will be based on the scores on the End-of-Course Test in Biology at the end of the semester. A final delimitation was the interviews will occur only with the teachers and administrators and not the students in the study.

Assumptions

I will incorporate certain assumptions into the study. First and foremost is the assumption that all interviews and questionnaires were answered by the participants honestly and that the instruments used for this will measure what they are intended to measure. I will also assume that the teachers involved in the study will teach from and follow the same set of lesson plans, and that the students involved in the study from both groups (single-sex and coeducational) will have similar expectations upon entering the biology classes. The final assumption will be that the two groups of students will also be basically equivalent in most areas. These areas include but are not limited to socioeconomic status, basic prior science knowledge as indicated by CRCT scores, and motivation.

Definition of Terms

Adequate Yearly Progress (AYP): Adequate yearly progress is a term used by the state of Georgia to measure a school's progress from year to year in accordance with the No Child Left Behind Act. The data are used to assess a school's progress including testing, such as the Georgia High School Graduation Test.

Coeducational: Coeducation is a term used to mean a class or school in which male and females are included in the same setting.

Criterion Referenced Competency Test (CRCT): The CRCT is the standardized norm-referenced test given to multiple grades in Georgia, including the 8th grade. The science portion of this test will be used to show equivalency data for the groups in the study.

Emotional Security: Emotional security refer to "individuals' feelings about taking risks and feeling secure in expressing different ideas and opinions." (Schunk, Pintrich, and Meece, 2008, p. 353)

End-of-Course Test (EOCT): The state of Georgia requires a standardized test that counts 15% toward a student's final grade. This test is called the End-of-Course Test. Biology is one of the courses with this state-mandated test.

Interest: Interest will refer to the self-appraisal of the student' perspective on their level of interest in biology after taking the course.

No Child Left Behind (NCLB): NCLB is a government act instituted in 2001 which is a continuation of the President Johnson Elementary and Secondary Education Act. Its design is "to close the achievement gap with accountability, flexibility, and choice, so that no child is left behind" (US Department of Education, 2009).

Participation: Participation will be the self-appraisal of a student in how they engage themselves in class discussions and other learning opportunities.

Peer help: Peer help will refer to the self-appraisal of the student's perspective on the amount of collaborative learning and group work in learning (Chen, 2002).

Referral: Referral is a term used to denote when a student is sent to administration for disruptive classroom behavior.

Single-sex: The term single-sex will refer to any class or school separated completely by sex (male and female).

Self-efficacy: The term self-efficacy will refer to the self-appraisal of one's ability to finish a task (Pintrich, et al., 1991).

Student achievement: The term student achievement will be used to describe the students' results on the End-of-Course Test in biology.

Title IX: As defined by the US Department of Education (2009), Title IX is "designed to eliminate (with certain exceptions) discrimination on the basis of sex in any education program or activity receiving Federal financial assistance, whether or not such program or activity is offered or sponsored by an educational institution as defined in this part. This part is also intended to effectuate section 844 of the Education Amendments of 1974, Pub. L. 93–380, 88 Stat. 484. The effective date of this part shall be July 21, 1975."

Chapter Summary

Since there are few empirical studies supporting or negating the effects of single-sex classes, the intent of this concurrent mixed-methods study was to analyze the effectiveness of single-sex instruction on student achievement. The landmark Title IX legislation in 1972 all but ended single-sex education in the United States. In 2001, the hiatus in single-sex education was lifted with the No Child Left Behind Act. Since the protocol for these classes was released relatively recently in 2005 (Davis, 2006), there is a large deficit in the amount of research pertaining to this viable educational initiative.

CHAPTER 2

REVIEW OF LITERATURE

One thing remains constant in the world of education, and that is change (Cable and Spradlin, 2009). Single-sex education is one of those changing ideas. At first, some areas of education were based on sex, albeit a segregated and not equal, curriculum for males and females (Friend, 2006; Spielhagen, 2008). After the passing of the Title IX legislation (US Department of Education, 2009), single-sex education was all but annihilated. However, almost thirty years after Title IX, No Child Left Behind brought new life to an old idea. Even though the American Civil Liberties Union (ACLU), the National Organization of Women (NOW), and the American Association of University Women (AAUW) have repeatedly stated that single-sex education is a step backward in curriculum (Hughes, 2006), the idea still has life and appears to be gaining momentum. Few can argue that there is not a gender gap in many academic subjects, such as math and science. The debate centers on how to close the gap. Even though there have been only a handful of statistically significant studies regarding single-sex classes and single-sex schools, there is little debate that some are showing positive results in regard to academics, discipline, and other areas. Since more and more schools are attempting to find a solution to the Adequate Yearly Progress (AYP) puzzle of test scores, socioeconomic patterns, bullying, and behavior issues, single-sex classes and the corresponding studies may continue to occur (Mael, et al., 2005).

History of the Original Single-Sex Option

Single-sex education covers a broad array of educational settings including but not limited to physical education classes, before and after school events such as the Boys

& Girls Club of America, gender-equity classes, and many others. Single-sex classrooms have been in education since the beginning of schooling in the United States (Friend, 2006), all the while being unrestricted by federal regulations (Gurian, et al, 2009). Most of these were in the area of private and parochial schools (Weil, 2008). In fact, according to Cable and Spradlin (2008), a trend toward coeducational classroom settings did not develop until the mid-1800s, which was considered the first large expansion of public education in the United States. Classes in the single-sex setting were intended to prepare males and females for different roles in life, such as agriculture and industry for males, and home economics for females (Cuizon, 2008). In other words, the idea of coeducation classes developed to open education to *all* youth, meaning girls should be included in learning ideals that could lead to higher education (Spielhagen, 2006). In fact, a vast array of single-sex female schools still exist in the post-secondary realm today that were created during this time, some even further segregated based on color (for example, black female universities). A similar result, although not nearly as high in number, occurs for the corresponding male universities. A strong reason many of these universities still exist is that post-secondary gender based education was mainly single-sex until well into the 20th century (Friend, 2006). For many post-secondary schools, the single-sex instructional models have been maintained and are still used (Gurian et al., 2009).

Title IX.

The basis of single-sex education in the public realm of elementary and secondary education was forever changed with the advent of Title IX in the early 1970s. Many educators, politicians, and feminists across the nation worried that the continuation of single-sex education would be similar to the notion of separate but equal in race-

segregated education. As stated by the National Organization of Women (NOW) and the American Association of University Women (AAUW), single-sex classes would create a separate and *not* equal access to education for females (Hughes, 2006), a possible sense of inferiority (Cable & Spradlin, 2008) and problems with maintaining equitable treatment within a segregated curriculum (Friend, 2006); however, according to *Brown v. Board of Education*, choice was not an option. In fact, the stance of the AAUW was a reversal of its first stance in support of single-sex education as a viable alternative to promoting achievement for girls in math and science (Spielhagen, 2006). Also, others, such as Theodore Shaw, director-counsel and president of the NAACP Legal Defense and Educational Fund, believe that even if there is a possibility of segregation based on gender, it may be a necessary evil when compared to the crisis of low-income and minority education in the US. Shaw stated that even though he fundamentally disagreed with segregation of education based on race or gender, he believed "the crisis among black males is so severe we have to have some room to experiment" (as cited in Cooper, 2006, p. 15). To further underscore the notion that segregation by sex could be a necessary evil, Cooper (2006) summarized Dr. Spencer Holland, an educational psychologist, who points to the fact that there are, by default, some all-male classes, called special education, a fact maintained by a study showing that boys are twice as likely as girls to be placed in special education classes (Thiers, 2006).

To be specific, Title IX legislation "prohibits discrimination on the basis of gender or race in any educational program receiving federal funds" (Friend, 2006, p. 3). Hughes (2006) further reported that the Department of Health, Education, and Welfare issued Title IX regulations substantially limiting the use of single-sex classes. Even

though Title IX restricted single-sex programs, the legislation did not state all educational activities remain coeducational; therefore, such entities as the Boy Scouts and Girl Scouts, which are tax-exempt, were allowed to remain (Cable & Spradlin, 2008), as well as physical education and sex-education classes (Ayres, 2006). However, there is a current change occurring to single-sex education, mainly in regard to low achieving disaggregated groups within many schools. Friend's study (2006) showed that the federal regulations have stymied certain attempts to re-establish single-sex education and are perpetually being revised since the advent of the No Child Left Behind (NCLB) legislation in 2001. This important legislation has allowed some parents who are disheartened with their child's schooling to explore more educational venues besides the typical classroom (Cable & Spradlin, 2008). According to the Center for Evaluation and Education Policy (CEEP), NCLB allowed public schools a chance to use federal funds (including incentive grants as indicated by the US Senate, according to a study by Hughes in 2006), to experiment with new programs including same-sex education (Cable & Spradlin, 2008). Even though traditional Christian communities were the main source of single-sex education in the United States, Hillary Clinton was quoted in 2001 as saying, "our long-term goal has to be to make single-sex education available as an option for all children, not just children of parents wealthy enough to afford private schools" (Cable & Spradlin, 2008, p. 3). The NCLB brought the idea of single-sex education new life, partly due to the reason students in primary and secondary education can create a culture that is not conducive to academic achievement (Herr & Arms, 2004), thus creating a need for a new culture in certain situations where parents can choose a learning

scenario that at a minimum lowers the distractions from the opposite sex on their children (Ferrara & Ferrara, 2008).

History of the New Single-Sex Option

With the advent of NCLB, single-sex education seems poised for a comeback after being all but destroyed with the *Title IX* legislation of 1972. Starting in 1995, Leah Hasty, principal of an inner city Baltimore public elementary school, created a few single-sex classes, finding that both boys and girls achieved at higher levels than in regular coeducational classes (Cooper, 2006). Hasty designed these classes in response to the lack of positive male figures for young, African-American boys in the neighborhood; however, these classes were eliminated by pressure from the Clinton administration and the National Organization of Women. Many years passed before NCLB opened the door to single-sex education in the United States once again in 2001. In October 2006, five years after the NCLB legislation first passed, the US Department of Education published changes in the Title IX legislation and regulation, thereby giving public boards of education more authority and liberty in expanding and experimenting with single-sex education in all levels (Sneed & Anderson, 2009). Even though some believe that an eventual Supreme Court ruling regarding the actual constitutionality of same-sex education will occur, over 300 schools as of today's date compared to just three in 1995 (Ayres, 2006) use single-sex classes. This translates into just over 1% of school districts in the United States including more than forty-two that are completely single-sex (Thiers, 2006). Cable and Spradlin (2008) provide a strong basis for the reason many schools have started to use single-sex education when they reported that courses in a coeducational setting could theoretically be separated by sex if the school provides a

rationale behind the need for the change, has a comparable coeducational course within the school or geographically accessible location, and there is a review of the single-sex classes conducted after two years. In fact, according to Logsdon (2003), the federal court system has consistently ruled that single-sex education does not violate the Title IX act.

In a study conducted by Mead (2008), recent neuroscience research showed major differences in the male and female brain and argued that educators must employ different pedagogical strategies in teaching male and female students. This rationale followed along with the research provided by Gurian, et al (2009) stating that at the individual classroom level, teachers will be able to offer more gender specific opportunities to address the differences in learning between male and female students, thus allowing teachers to adjust to the various learning styles of each sex (Ayres, 2006). However, with single-sex classes being a relatively new protocol, there is a severe lack of crucial data available. In the landmark study conducted for the federal government, Mael, Alonso, Gibson, Rogers, and Smith (2005) found that the use of single-sex classes benefiting either sex could not be proved due to insufficient studies. In their report, Mael et al (2005) conducted an extensive review of literature and found that only 102 studies could be used as a basis for reviewing single-sex effectiveness on student achievement or behavior. Test scores including those in science, math, verbal/English, and social studies, final grades in class, postsecondary test scores, college graduation rates, college attendance, and time spent on homework were used to measure achievement. Social aspects such as physiological factors of self-concept and self-esteem, attitudes toward school, attitudes toward working women, along with others were used to measure behavioral aspirations of single-sex classes. Their general findings are single-sex

schooling either had a somewhat positive or null effect on student achievement and that there must be more data to show a statistical significance of these findings.

One might believe that with all previous data and court rulings, single-sex classes would be the most provocative topic and venture in education today. However, even with the advent of the NCLB stipulations, some districts are having difficulty implementing the single-sex idea. For example, the ACLU filed a suit against the proposal for a single-sex education school district in Louisiana. The ACLU believed that the plan would have violated both Title IX ideals and the Louisiana state constitution (Klein, 2006). However, some of the legal issues could have been avoided with proper planning, as in the case of a suit brought again by the ACLU in Mobile County, Alabama. The school district segregated *all* classes in a middle school without informing the parents (Sneed & Anderson, 2009). A similar case occurred in Moulton, Alabama involving the ACLU again. Most of the suits involved aspects in which part of the regulations set forth by the NCLB regulations were not followed, such as making sure coeducation classes were geographically near the single-sex classes (which can be within the same school) or offering a rationale for the change (Cable & Spradlin, 2008; Sneed & Anderson, 2009), neither of which were followed in the aforementioned legal cases. According to a report by Sneed and Anderson (2009), "what this means for public school districts considering offering single-sex programs is that before even considering opening such a school or classroom, a district should develop a comprehensive policy that addresses the requirement in the regulations" (p. 31). Other stipulations include developing a rationale for the classes that can not be based on gender stereotypes, the programs must be offered in a well-balanced manner, and periodic evaluations of the classes at least every two

years must be performed (Cable & Spradlin, 2008; Sneed & Anderson, 2009). These protocols coincide with a *USA Today* report that emphasizes that single-sex classes will succeed only with a great deal of planning and the proper application of research ("Single-sex Classes," 2007). However, districts would be wise not to limit their rationale for implementing single-sex classes to just improved academic successes with high-stakes testing. Even though test scores seem to be the way most programs are evaluated, others, (e.g. Ayres, 2006; Mael, et al., 2005) believe the number of students participating regularly in class could be a better way to evaluate the success, thus negating certain social aspects that are detrimental to learning.

Positives and Negatives of Single-Sex Education

Discussing the positives and negatives of single-sex education can be a daunting and a somewhat political task. One example of the political issue can be seen in a study by Rogers (2008) that indicated one of the reasons girls tend to perform more poorly in math is that they are constrained by differences in their physiological tendencies. Such a report could create a firestorm of issues. A trait that is seen as positive by one person or group may be seen as detrimental by another, possibly supported by stereotypes instead of true data, thus creating political entanglements. To combat the perceptions that can create these political issues, I will try to base all positives and negatives of single-sex classes presented in this study on research based pedagogical tendencies. However, one cannot rationally argue that there are not student performance inconsistencies between male and female learners (Rex & Chadwell, 2009). All positives and negatives outlined below deal mainly with the norms, not the exceptions.

Physiological learning differences.

Most people would agree that males and females are different. In fact, a national best-selling counseling book by Dr. John Gray is entitled "Men are from Mars; Women are from Venus" illustrates just from the title the obvious differences between the sexes in regard to understanding and developing relationships. Cable and Spradlin (2008) stated the brain develops and functions differently between the genders, a concept corroborated by Hughes (2006), who reported the physiological and psychological differences between males and females required different teaching strategies, at different times. Sax (2007) stated that asking students to perform in areas in which they are not developmentally ready due to these physiological differences is unfair to the students. He further stated:

> A generation of neuroscientist came to maturity believing that 'sex differences in the brain' referred primarily to mating behaviors, sex hormones and the hypothalamus. That view, however, has been replaced by a surge of findings that highlight the influence of sex on many areas of cognition and behavior, including memory, emotion, vision, hearing, the processing of faces and the brains response to stress hormones" (as cited in Bracey, 2007, p. 24).

Weil (2008) showed that these physiological and neurological differences even go so far as temperature, stating that boys preferred a lower temperature setting in their classrooms than do girls (a fact agreed upon by "Single-sex Classes," 2007). According to Cable and Spradlin (2008), twelve-year old girls have hearing that is seven times more acute than boys the same age. Cable & Spradlin (2008) also reported on the findings of researchers at Virginia Tech showing that the language and fine motor skills developed four years

earlier in girls than boys, but that spatial reasoning and geometry skills developed fours years earlier in boys than in girls. These reports showed why boys experience earlier success in math and science, and girls in language and fine arts, a fact supported by data showing a gender gap in academics (Gender Gap in Higher Education Holding Steady, 2010). An interesting example of this difference was shown by Friend (2006) when she observed students drawing pictures of their idea of a scientist; most drew a male figure, even the girls. One could assume from her findings that if one were to draw a picture of a Broadway star, it would be mostly females since a great number of younger students associate the fine arts with female characteristics. Keeping the sexes separated during academic instruction in all areas could help the maturation process, as well as the confidence and security to ask needed questions in the classroom for further understanding and working with others. However, Ferrara (2008) showed in her study that when given the opportunity, boys tend to pair of with boys and girls with girls during cooperative learning.

However, not all psychological arguments are in favor of single-sex schooling. According to Mead (2008), other scientists have argued gender is too vague to differentiate educational approaches. She further expounded on this idea by stating "if one is really concerned about adjusting education to variation in children's development, increased customization and multi-age groupings in early elementary school, which allow teacher to group children who are developmentally similar, regardless of age, and children to progress at their own paces, are a far better solution than simple separating children by sex" (p. 1); however, I could find only a single school in the area in which this study took place that grouped children by developmental stages in elementary school

instead of age, a somewhat daunting task, both in the educational and political realms. Also, this model took place over fifteen years ago, was used only in kindergarten and first grade, and no data were kept. Mead's idea is supported by a statement by Cable and Spradlin (2008) and a quote by American University professor David Sadler (Flannery, 2006) who stated that the differences *within* a sex are much more prevalent than *between* the sexes. Tsolidis and Dobson (2006) have taken the gender differences one step further by looking at long-range implications. They stated that if the schools do have a significant impact on the construction of femininity and masculinity, then single-sex schools will more than likely have a short- and long-term impact not only on the students themselves, but also society as a whole.

Learning Styles.

Differences between male and female learners reach further than just physiological likes and dislikes and rates of maturation. Ryan (2009) found there are neurological differences in learning styles. Male students usually use an assimilator style of learning (value rationalism and objectivity, good at ordering, logical, prefer didactic learning) and females use the reflector style of learning (somewhat similar to assimilator, but includes the variances of cautiousness, good listening, and observation). In further regard to learning styles based on neurological differences, others report differences between male and female learners as well. Cable and Spradlin (2008) reported that boys prefer learning tasks that involve competition. For example, Ferrara (2006) reported that boys responded positively to techniques such as betting a task can or cannot be done, whereas girls did not respond as enthusiastically. Also, Rogers (2008) indicated that the boys wanted to beat the girls in academic measures as a means of motivation for learning,

though Rogers also indicated competition increased in the girls' classes as well. Rogers further reported girls prefer collaborative tasks, a fact agreed upon by Hughes (2006) who reported that girls tended to use more words during the learning process than boys, thus possibly causing them to be more receptive to collaborative learning than boys. These reports found that girls have both had an easier time of learning and that learning became more meaningful; however, Rogers (2008) showed that both girls and boys became more collaborative with both the teacher and classmates in single-sex classes, including helping those who did not comprehend the assignment. In addition, findings indicated that girls tended to become more willing to admit that they did not know a concept without fear of being insulted. However, Rogers admits her study needs to be replicated.

Ferrara (2006) reported another difference when she noted that teachers had to teach in shorter direct instructional segments during the period for boys as opposed to girls. Logan (2007) concurred with this train of thought in regard to computer education, finding that girls prefer a more concordant approach to learning. The argument of neurological differences, therefore, is not based in the difference of learning styles, but in how the styles can best be accommodated in the educational setting. According to Karen Stabiner, "educators at single-sex school already get it: equality is the goal, and there may be more than one path to the destination" (as cited in Gurian, et al., 2009, p. 234). In fact, Rogers (2008) indicated in her study that teachers considered themselves more facilitators than instructors in the single-sex classes, which means a higher level of engagement is being used, which could lead to improved student achievement.

Opportunity and participation.

Another benefit of single-sex education deals with opportunity. Boys, in general, are more aggressive, which could be an avenue used to vie for teacher attention (Hughes, 2006), and generally need more space to move around (Ayres, 2006; "Single-Sex Classes", 2007). Jerome, Rozsa, Bane, Klise, and Clark (2006) found the same issue in their study when they quoted a young boy at Woodward Avenue Elementary as saying, "I like it loud and I can move around" (p. 83). Males can generally be misinterpreted as being rude when in fact they are just expressing their normal spatial and aggressive tendencies (Hughes, 2006). What one can conclude is that because boys are more aggressive and need more space than girls, they will require more teacher attention, thus creating more opportunities to either participate or, at least, take opportunities away from the girls. Hughes (2006) agreed with the participation aspect when she stated in regard to single-sex classes, improved behavior can lead to increased participation, as well as a sense of companionship (Rogers, 2008). Hughes continued this thought when she stated girls feel more comfortable in participating in all areas of the lesson. This was supported by the researchers Hoffman and Badgett's research (2008) who found that girls' responses in single-sex classes were consistently more optimistic, the classes were more orderly, the teacher had to exert less control than in their coeducational classes, and the levels of teamwork, camaraderie, enthusiasm, and academic risk-taking were much higher. According to one teacher participant in the study: "I do think teenage girls perform better being isolated and not being bothered. Girls achieve better across the board" (p. 25). Herr and Arms (2004) showed the same findings when they quoted a girl who stated that girls in the single-sex classes are not concerned with appearing smarter

than the boys. This is also supported by Salminen-Karlsson (2007) when describing a girls' class as being well-functioning, open, and encouraging and not being aggravated by the boys. Spielhagen (2008) continued these thoughts with more direct interview responses from students reiterating the same ideas as Herr and Arms, such as girls not being picked on by boys when asking questions or appearing smarter than the boys, and teachers stating information in ways that girls can understand more readily. The ability to have more positive female role models in single-sex education can be another way in which opportunity for girls, especially in math and science classes, can be enhanced (Logan, 2007). Ferrara's study (2008), which investigated the effects of single-sex middle school classes on student achievement, demonstrated girls move at a quicker pace, and both boys and girls were less self-conscious about their performances in the single-sex classes, thus corroborating the positive effects mentioned above of single-sex classes. However, as most of the studies described here are at least somewhat qualitative in nature and sometimes dealt with anecdotal statements, more studies must be completed to corroborate the findings.

Another example of opportunity can be shown in regard to how males and females learn differently. Males and females will sometimes consider the same phenomenon as a strength in one gender and a weakness in the other. According to Salminen-Karlsson (2007), "the reason why girls are not as interested in technology as boys is they are not encouraged to acquire the same experiences of artifacts – and especially of motion – in their early childhood. According to this ideology, when children grow older, boys who have had these experiences see technology as their domain, and do not allow girls to enter into the activities and discussions in which

technical knowledge is exchanged and developed" (p. 1021). She further suggested that when learning with manipulatives does occur in the classroom, boys are more aggressive and tend to seize the equipment first.

One not need believe, however, that the areas of participation and opportunity are only of a benefit to female learners where boys are not commandeering the time of the teacher. Rex and Chadwell (2009) reported in surveys administered in South Carolina to students in single-sex classes, students believed that they had increased participation in both the girls and the boys classes, and also a greater willingness to try new activities. In regard to male learners, single-sex schooling afforded boys a more comfortable area to participate in areas where emotions are expressed, such as reading poetry in a literature class, or in the areas of fine arts, drama, or music (Hughes, 2006), their behavior can be more tempered, paralleling the girls behavior (Hoffman & Badgett, 2006), and they can still work individually but will consult with each other more, mirroring the collaboration discussed previously regarding females (Salminen-Karlsson, 2007). Hughes (2006) further expounded that in the fine arts in single-sex classes males do not believe that these areas are feminine and are freer to express their true desires in these areas. Jorgensen and Pfeiler (2008) reported in their research a perfect example of these characteristics in fine arts by their creation of two single-sex chorus classes. When boys became very timid in singing as their voice changed, they become less so when surrounded only by male counterparts, thus not being affected by feelings of embarrassment if girls were in the same class. This effect resulted in a raise their comfort level. Gurian et al. (2006) showed a school in their study had fewer discipline referrals in boys classes that were credited to the fact teachers were able to be more tolerant of male

behavior and energy without the girls in the classroom. However, once again, there is a lack of sufficient data corroborating these findings, underscoring a need for more studies

Opponents tend to believe separate classes create a sense of segregation will result in unequal opportunities. However, some researchers argue separation can actually create equal opportunities for females instead of destroying them. In fact, the National Association for Same-Sex Public Education (NASSPE) reported that due to these opportunities, girls who graduated from all girls' high schools are six times more likely to major in math or science, traditionally male-dominated subjects, than those from a regular coeducational school (Cable & Spradlin, 2008). These findings contested the so-called "shrinking violet" syndrome (Rawe, 2005, p. 60) in which females are underrepresented in computer science, physical sciences and engineering when entering post-secondary schools. At the same time males believe they are less than adequate overall in the areas of reading and language arts in coeducational classes (Kessels & Hannover, 2008). Sax (2010) and the NASSPE believe that single-sex classes are a way to combat these tendencies and promote female participation in the computer science, math, engineering, as well as promoting girls participation in competitive sports.

Tsolidis and Dobson (2006), described in their study on a system in Australia which ranked entering students on a percentage based on other students entering (for example, an enter rate of ninety percent means the student finished ahead of approximately ninety percent of other entering college freshman). Their results showed students from single-sex schools had higher enter rates than those from coeducational schools. Further, Rex and Chadwell (2009) reported that in South Carolina over two-thirds of parents surveyed saw an increase in their child's self-confidence and

independence, furthering the notion that opportunity is increased with single-sex classes. In Jorgensen and Pfeiler's (2008) report, a male student who was reluctant to raise his hand or read aloud in class, after participating in the single-sex classes was no longer afraid to speak in front of his class or other groups and even encouraged his younger brother to overcome his shyness by enrolling in the single-sex classes in his school. In a study conducted for the US Department of Education, Mael, et al. (2005) found fifty-seven percent of the studies conducted by 2005 in regard to single-sex education showed an increase in the positive self-concept of the students in the single-sex classes (though this part of the report included only seven studies, once again showing a need for more research), and a sixty percent increase in students feeling they are their own locus of control (though only five were included in this part of the research). Kessels and Hannover (2008) found similar results in their study of self-concept of ability, leading them to conclude that single-sex education helps adolescents gain a better concept of ability in school curriculum that they might consider inappropriate for their own sex. An increase in self-concept meant a concurrent increase in those willing to ask questions, read aloud, participate in class, etc. However, through this massive study, one can plainly see that more studies must be completed to make the findings more statistically significant. It is also noteworthy that only thirty-five percent of the schools in the comparisons were public schools. Even Mael, et al. stated in their report to the federal government in 2005 the amount of sound evidence is limited.

Social interactions and behavior.

A third aspect of single-sex classes is the diminishing of social distractions, which also included discipline issues. Cable and Spradlin (2008) described social distractions

as students being preoccupied and distracted by the opposite sex which causes learning to "take a back seat" (p. 6). They further reported in a study conducted by Leonard Sax, founder of the NASSPE, there is a lower rate of teenage pregnancy, greater independence by girls in boy-girl relationships, and also a lower threat of drug abuse in single-sex classrooms. Other findings by Cable and Spradlin (2008) showed girls are less likely to be concerned with appearance, which was corroborated by Ayres (2006). Ferrara (2006) substantiated these findings when she indicated the boys sometimes need a buffer to handle classroom and social settings in classes, and these buffers were the girls themselves in many instances.

Hoffman and Badgett (2008) described single-sex classes as an environment free of male command. They further described the reaction by the girls in the coeducational classes as the corresponding inhibition of female contribution resulting in an environment with diminished feelings of embarrassment when participating in class. Jerome et al. (2006) quoted a teacher that noticed "I see my girls aren't too worried about primping; the lip gloss and hairbrushes aren't coming out" (p. 84). Even in elementary school, the distance between boy and girl relationships is closer and more prevalent than one might think. Take for instance a quote from an elementary student in a paper by Flannery (2006) when asked if she misses boys: "Miss boys? Oh no! One chased me at recess today. Tried to kiss me. Oh no, we will never miss boys" (p. 33).

However, in a few cases, the opposite sex was more glamorized, thus creating a more difficult learning environment, bringing the social distractions back into the classroom. One such example was presented by Hoffman and Badgett (2008), who found that the single-sex classes resulted in lower student achievement and also perpetuated

gender myths. They continued to present mixed results of girls and boys in single-sex classes when they found some boys actually thought having the girls in the classroom with them was better because girls cooperated more easily. To continue a pattern of mixed results in the limited amounts of studies conducted on single-sex classes since the Mael, et al. (2005) study, Spielhagen (2008) showed some all-girl classes with female teachers can create an adversarial relationship, thus *increasing* the number of discipline issues in the classroom. Cornelius Riordan from Princeton University, as cited by Bracey (2007) explained how the differences between single-sex and coeducational settings can affect learning:

> Single-sex schools are places where students go to learn; not to play, not to hassle teachers and other students, and not primarily to meet their friends and have fun. Aside from affluent middle class communities and private alternative schools, coeducational school are not all about academics…The problem is not just about youthful anti-intellectualism, antisocial behavior, athletics and rock concerts, sexual harassment, heterosexual attraction and subsequent distraction, and the contentiousness that comes form increased diversity in the schools; it is about all these things and more" (p. 24).

Other studies, such as the one conducted by Gurian et al. (2006), pointed to the fact teachers in single-sex classes are able to deal more directly with the social and emotional needs of their students when the opposite sex is not in the room, which is similar to the idea of boys wanting to see male doctors for their physicals, and the same for girls, thus dropping the amount of improper behavior. This fact is agreed upon by Rex and Chadwell (2009) who reported one of the schools in their findings had discipline

problems in their single-sex classes to drop from a ratio of 0.36 discipline incidents per child to 0.06 percent in only one year, a remarkable achievement. A similar result was found at the Booker T. Washington 9th grade, which saw a drop in referrals by sixty percent in the first year of single-sex classes (Davis, 2006), as well as the Thurgood Marshall School in Seattle, where discipline referrals dropped from over thirty per day to fewer than two (Cable & Spradlin, 2008). Logan (2007) agrees with the discipline theme by stating in the studies she consulted, behavior of both boys' and girls' classes were better, and the learning was more enjoyable.

Other studies, however, show a negative effect on discipline, or at least a possible explanation for the decrease in referrals. A reasonable answer to this drop might not be only the use of single-sex classes, but also teacher perception. Dee (2006) in his study of the National Assessment of Educational Progress male and female test scores and possible theories explaining such differences showed that when a class is taught by a woman, boys' behavior is more likely to be seen as disruptive, and girls are not as likely to look forward to any class taught by a man. Further, in Outlaw's study (2008) of two middle schools implementing single-sex classes, discipline referrals decreased in one, and were not positively affected in the other. It is important to note the reduction in referrals at any school does not automatically insinuate an increase in on-task behavior or direct instruction (Outlaw, 2008). However, according to Ferrara and Ferrara (2008), data in their study hinted that students in a single-sex environment may learn with fewer disciplinary situations than in coeducational classes. With the lack of much critical data, more studies must be performed to statistically show as significant the assumed relationship between fewer distractions and increased learning.

Another positive point of social interaction in single-sex classes was indicated in a study by Jorgensen and Pfeiler (2008). In their work, the idea of single-sex male chorus classes showed that the boys' natural energy and enthusiasm resulted in vigorous singing without any reluctance. Having girls in the same classroom could have resulted in either the boys not being free to express their singing voices, or the teacher not allowing as much energy as the boys would have normally had without girls present for fear of discipline issues, thus missing an opportunity for each boy to excel. However, it is important to note that other studies, such as Logan's (2007), stated that single-sex education is not truly a real-world scenario, as compared to a typical workplace where very few such workplaces are either all male or all female.

Male and female likes and dislikes.

Other portions of the social aspect include such simple things as likes and dislikes. In Weil's report (2008), younger male students in science classes stated they enjoyed the idea of being apart from their girl counterparts because the girls do not like the same jokes and are afraid of snakes. In 2006, Spielhagen conducted a qualitative study of perceptions of sixth, seventh, and eighth grade students in single-sex classes in regard to likes and dislikes. Younger boys and girls reported their opposite-gender counterparts as loud and irritating (Spielhagen, 2006), and sixty-two percent in this same study stated they could focus more without the opposite sex present. Boys even responded to teaching techniques differently than did girls. Hughes (2006) reported that because of these likes and dislikes, a teacher's biology class that was involved in her study and was performing dissection with coed lab partners; however, the girls generally did not perform any operations during the dissection. This fact could be possibly altered

with single-sex classes which would force the girls to be a physical part of biology dissections.

Testing and academic achievement.

It would be impossible to discuss academic achievement without including the No Child Left Behind legislation in regard to a large number of testing implications. No matter the venue, the words spoken by teachers, parents, administrators, etc, and/or what is printed, test scores are still the main focus for how a school's progress is reported and judged (Georgia Department of Education, 2010). Whether or not one agrees with the idea of high-stakes testing, the process appears to be here to stay. Graduation rate is closely behind testing in regard to judging school and teacher effectiveness. According to Dee (2006), on national assessments since 1970, girls outscore boys in reading, and boys outscore girls in math and science. Single-sex classrooms are one idea being used to combat the area of weaker test scores in certain schools, especially in locations where there is an intermingling of minority and low socioeconomic status.

In the study mentioned previously regarding Woodward Avenue Elementary School in Florida (Jerome et al, 2006), test scores of the Florida comprehensive Assessment Test (FCAT) found some positive results in regard to single-sex classes. Boys in the single-sex classes scored at a forty-nine percent higher proficiency than boys in coeducational classes, and girls sixteen percent higher (Cable & Spradlin, 2008; Gurian, et al. 2009; Flannery, 2006); however, Jerome et al. (2006) attributed the achievement at Woodward to smaller class sizes and extremely motivated teachers and students. The NASSPE highlighted the Thurgood Marshall Elementary School in Seattle as another positive aspect of single-sex schooling in regard to test scores when the school

went to single-sex classes (Cable & Spradlin, 2008). In regard to the Washington Assessment of Student Learning (WASL), boys' scores increased from the tenth to the sixtieth percentile, and the girls' scores, which previously had no students passing the WASL in coeducational classes, went to fifty-three percent passing after the change to single-sex classes, which also lowered the achievement gap between male and females. The close in the achievement gap was also shown in the findings of Younger and Warrington (2006) who reported benchmark testing in a school in England implementing single-sex classes had an achievement gap of only one percent. Gurian, et al. (2009) reported that Hope High School in Hope, Arkansas, after implementing the single-sex classes in 9th grade, went from twelve percent of their students failing all four classes (in a four by four block schedule) to none who failed all four, only two had failed two courses, and only eleven had failed one course. Even though the numbers were in regard to only individual schools (once again showing the need for more research), the achievement gains were massive. A similar small-scale venue for single-sex possibilities is the Young Women's Leadership School in Harlem, which boasts a 100 percent graduation rate (Cable & Spradlin, 2008). Ayres (2006) reported the results of a four-year study at Cambridge University in England that showed single-sex classes can increase boys' performance in many area, particularly in foreign languages and English, and girls in science and math. Geiger Elementary School in Fairfield County, South Carolina, once beginning single-sex classes in seventh grade had only four failures compared to fifty the year before. Kingstree Junior High in Williamsburg County, South Carolina reported a decrease in 7th grade students performing below basic on the state proficiency exam from fifty-five percent to less than twenty-five percent (Rex &

Chadwell, 2009). In a study conducted by Cambridge University in England, Logan (2007) found that both boys and girls in single-sex classes performed better than those in coeducational classes, especially during their final years of secondary school, sometimes as much as fifteen to twenty-two rankings higher. However, one must note that in a good many of the studies that do show academic improvement, many are from private schools (Mael, et al. 2005), and/or have smaller student bodies or are experiments in single classes, or other institutional factors. Such studies were conducted by Friend (2006) and Outlaw (2008), whose studies, in fact, did *not* show a statistical increase in student achievement, and Spielhagen (2008), who indicated in his study the effects on test scores from single-sex classes were positive for some, but did not guarantee an increased performance on standardized tests.

Other mitigating factors include the idea that if a teacher is more enthusiastic about the single-sex classes, achievement could be affected positively due to this belief, not necessarily due to the single-sex concept: In other words, "Good teaching is good teaching" (Hoffman & Badgett, 2006, p. 26). Hoffman and Badgett (2006) also indicated most of the studies that do show positive achievement goals related to single-sex instruction come from single-sex schools, not just single-sex classes. Dee (2006) pointed to facts in his research "teachers, both men and women, treat boys and girls differently in the classroom" (p. 70), but he further stated his studies showed girls perform better when taught by women and boys do better when taught by men. In fact, his analysis showed in three subject areas taught by females (math, science, and English), the achievement of girls increased by four standard deviations, but the boys dropped by four, thus creating an eight percent standard deviation gender gap. Ferrara (2008) concurred there are teaching

differences that occur when she stated one important part of her study was observing teachers changed their teaching strategies to better respond to the needs of boys and girls. However, as mentioned previously, the way to judge the effectiveness in a classroom in regard to academics may be participation and not just test scores since there are so many contributing factors to test scores besides class environment, even including increased attendance (Ferrara, 2006). As Ayres (2006) stated, "even if test scores don't rise, the social elements might signal success" (p. 5)

Enjoyment.

A sixth grade student in Spielhagen's (2006) study stated, "have you ever heard that saying 'time flies when you're having fun?' All-boy classes are fun!" (p. 68). Realizing that this is just a perception, educators must believe, however, perception is reality to many. According to Logan (2007) girls perceived their girl-only classes as being more cooperative, and boys perceived the all-boys classes to be closer to their preferred learning environment. If perception of enjoyment means increased academic achievement, then the availability of single-sex classes could be viable. However, more studies must by conducted.

Socioeconomic status.

A final characteristic that showed single-sex education may prove successful, at least in a few settings, is in the area of low socioeconomic students. Many of the studies reviewed in the literature pointed to the fact segregating students by sex in regions with a high poverty rate does positively affect student achievement. According to Cable and Spradlin (2008), there are positive outcomes for disadvantaged students when taught in single-sex classes, a statement that was in corroboration with the study by Tsolidis and

Dobson (2007). If single-sex education can be used as a venue for increasing student performance in low-poverty school districts, then more studies must be conducted to verify some of these findings.

Chapter Summary

Single-sex education, though a staple of American education for over a century, is still the subject of hot debate. Although many agree with the notion separating the sexes for educational purposes has many advantages, many others disagree with the concept. Both groups have valid points, each of which are backed by certain research data. According to Tsolidis and Dobson (2006), "evaluating the worth of single-sex provision is notoriously controversial, given the difficulties encountered isolating school type from other factors. To suggest that what makes the difference is the single-sex component of an education in isolation from the curriculum, the dedication of staff of the students' cache of cultural capital for example, is somewhat risky" (p. 217). Kessels and Hannover (2008) echoed these thoughts when they stated "because single-sex schools tend to be highly selective with respect to both students and teachers, it is often impossible to rule out the possibility that factors other than grouping composition account for differences between pupils from single-sex vs. coeducational schools" (p. 274). Even though the majority of the arguments for single-sex education mainly focus on the interactions between students (Dee, 2006), there is no feasible way any type of research can negate all other factors except single-sex classes and conclude single-sex education is the one reason for any academic gains and classroom culture differences as opposed to type of school, socioeconomic background, parental education level, teacher effectiveness, etc.

However, the limited amount of research, as stated by Mael, et al (2005) tends to show that more research needs to be done in the area of single-sex education.

When choosing an educational setting, one must look at a variety of factors. Since education is such a personal goal-setting venue, choice must be prevalent to better suit the needs of not just a few, but the majority of students who are being educated. Whether one believes single-sex education has the potentiality as a viable solution to certain academic inadequacies, one cannot ignore the fact that the gender gap in science and reading approximately doubles between the ages of nine and thirteen (Dee, 2006). As Dee (2006) stated, while he knows sex matters in the classroom, the exact reasons are unknown. More studies must be conducted to destroy the uncertainty resulting from the lack of applicable data (Ferrara & Ferrara, 2008). To summarize Spielhagen (2008) when questioned as to whether single-sex classes positively affect student achievement, the resounding insinuation is only a definite maybe. More data must be given to bring about an answer to this possible intervention for student achievement.

CHAPTER 3

METHODS

The purpose of this chapter is to provide a description of the procedures for completing a study of the academic achievement and classroom experiences of the students, teachers, and an administrator in single-sex ninth grade biology courses. The focus of the study is an analysis of End-of-Course Tests (EOCTs) in biology scores (Georgia Department of Education, 2010) as well as both quantitative and qualitative data from the student questionnaire, and qualitative data from teacher/administrator interviews. Details of the method employed in this are presented below. Combining both quantitative and qualitative data will yield a richer understanding of the possible value of single-sex education.

Role of the Researcher

This researcher is an assistant principal and am intrigued by any and all ethical means that can be used to increase student achievement. Single-sex classes were a venture brought to the leadership of a high school in South Georgia by two science teachers as a viable way to achieve academic gains. When the single-sex classes (ninth grade biology) were first used on a trial basis, only two classes of the five total biology classes in the spring semester of 2010 were divided by sex. The classes showed such promise at the conclusion of the spring semester 2010, the leadership of the school expanded single-sex classes to four sections in the fall semester of 2010. This researcher conducted the study to determine if a relationship exists between student achievement and the use of single-sex classes.

Bias

Merriam (2009) stated that researchers need to explain their dispositions regarding the research to be conducted, including assumptions, worldview, experiences, and any other matters that could prove an impediment to thoughtful and reasonable analysis of the data. In regard to personal bias, this researcher was hoping that the use of single-sex classes will prove beneficial, not only to the students' test scores, but also to many other facets of learning. Some of these facets include class interactions, class discussions, student/teacher interactions, students' sense of security and safety, higher level questioning and responses, and a general atmosphere conducive to learning. However, to compensate for these biases, this researcher had no direct contact concerning the single-sex classes with either the teachers or the students involved in this study, other than the collection of data described.

To provide for anonymity, all data collected on standardized test scores was gathered by the school's instructional coordinator, and an anonymous student questionnaire was administered by the instructional coordinator. The student questionnaire was administered in the fall of 2010 for the students who were in the coeducational classes in the spring of 2010, or after the final exam on the last day of class for those in the fall 2010 biology classes. This safeguarded the students so that they felt freer to respond truthfully without fear of reprisal. The teachers, who planned together and follow the same set of lesson plans, also followed identical lesson plans in their single-sex and coeducational classes and did not alter the initial design of any unit they taught. These data were used to critique the effectiveness of single-sex classes on student achievement.

Sample and Sampling

The sample in this study was gathered using convenience sampling of naturally occurring pre-existing groups within an area of study (Gay, Mills, & Airasian, 2006). In this case, the sample was five of the six current ninth grade regular biology courses, four of which are single-sex, and also included the three coeducational biology courses in the previous semester in a high school in South Georgia. The adult participants in the study consisted of the two ninth grade biology teachers at the South Georgia high school and the ninth grade administrator. The school is on a four-by-four block schedule, with students taking four courses per day for ninety minutes per course. The two teachers, one white male and one white female, teach all regular biology classes at the school. Pre-AP biology courses will not be single-sex nor will they be used in the data for coeducational classes. The 9th grade administrator is a white female. The student participants consisted of all first time 9th graders enrolled in biology at the school in addition to the coeducational biology students who took the course as first-time 9th graders in the previous semester, spring 2010. The two biology teachers had the same planning period, so each will teach a biology class simultaneously. These classes, except for the one block of the day where one teaches pre-AP classes, were divided into male and female classes, thus the convenience sampling. The overall population of the school is approximately 1350 students and consists of approximately 52% African-American, 41% white, 2% Asian, 2% Hispanic, and 3% multi-racial/other (Georgia Department of Education, 2009). The percentages of ethnicity of the sample of students (n = 175) who were in the single-sex and coeducational biology classes fall along these proportions, as well.

In the study, there were 175 student EOCT test scores uses (n = 175). These 175 students in the single-sex and coeducational classes had their EOCTs analyzed. Sixty-nine students' EOCT scores (37 female and 32 male) were used in the coeducational data (spring 2010 and fall 2010) and 57 female and 49 male students were involved in the single-sex classes in the fall of 2010. One hundred fifty-two (n = 152) students took part in the anonymous student questionnaire, with 43 males and 53 females in single-sex classes, and 27 males and 29 females in coeducational classes. The sample sizes of 175 for the test scores and 152 for the questionnaire provided about an 80% chance of detecting a standardized mean difference of d = .50 according to Maxwell and Delaney (1990; see Table 3.7 p. 116). Note that an effect size d = .5 represents half a standard deviation difference in achievement between groups.

Instrumentation

The data used in the study was both quantitative and qualitative in nature and took place concurrently. The quantitative analysis consisted of the EOCTs for the student participants (in which grades are assigned as any test, but generally range from 40 to 95 with 70 considered passing) and the scales from the student questionnaire which are self-efficacy, participation, peer help, emotional security, and interest in the biology class.

Instrument development.

The student questionnaire (see Appendix B) was developed by combining items from multiple questionnaires. Prompts were chosen which related to the classes involved in this study, specifically high school biology classes. Internal consistency used in this current study is reported in chapter four. A Cronbach's alpha of .70 was considered acceptable.

One questionnaire used for the development of the student questionnaire used in this study was the Motivated Student Learning Questionnaire (MSLQ; Pintrich, et al., 1991). The MSLQ questionnaire has multiple sub-scales which include self-efficacy (three items chosen), participation (one item was chosen), and peer help (two items were chosen). The items were reworded to focus on biology. One example of the rewording is in the question that was originally stated as, "When working in the class, I often try to explain the material to a classmate, or have them explain it to me." The reworded question reads as "when others needed help, I would explain to them what I knew about biology." The original items as well as the reworded items are located in Appendix D. Pintrich, et al, (1991) report an internal consistency, Cronbach's alpha, of peer help as .76, self-efficacy was .93, and participation was .69. Cronbach's alpha for the student questionnaire for this study for self-effiocayc was.76, was .46 for peer help, and .43 for participation. A test/retest reliablibly was performed for peer help and participation and is discussed later.

A second questionnaire used for the development of the student questionnaire was developed by Hoffman, Badgett, and Parker (2008). It was used in a study of high school students, their grades, and classroom culture, and was used in this study for participation, emotional security, and peer help data. Questions chosen from this instrument include three for emotional security, one for interest, and one for participation. As with the MSLQ, questions were reworded to focus on biology and both the original and reworded questions can be found in Appendix D. An example of an original question is, "I felt safe in this class," whereas the reworded question is, "I felt safe in biology as compared to my other classes." Hoffman, Badgett, and Parker (2008) demonstrated structural validity,

where items for each subscale aligned as they should, using factor analysis, with their correlation ranging from .57 to .72 and were considered moderate to highly reliable. The variables of classroom climate and opportunity to learn in Hoffman, Badgett, and Parker's (2008) study, which is where four of the items on the student questionnaire were found, had a Cronbach's alpha value of .85 and .81, respectively. The Cronbach's alpha in this study for emotional security was .73 and for interest was .77.

A third questionnaire was developed by Gardner and Tamir (1989) and dealt with the interest in biology courses. One question will be used for interest in addition to one question used for self-efficacy. One of the original questions is, "I am often frustrated not knowing what is going on," whereas the reworded question is, "Sometimes I participated less in biology because I did not know what was going on." Internal consistency was stated using rotated factor loadings equal to .58 for interest.

A fourth questionnaire used in the construction of the student questionnaire was developed by Trumper (2006) and dealt with interest. One question was selected for inclusion in the current study (see Appendix D). The original question was, "School science has opened my eyes to new and exciting jobs," and the reworded question is, "Biology has opened my eyes to new and exciting jobs." In regard to internal consistency with interest, a Cronbach's alpha of .79 was reported by Trumper for interest.

A fifth questionnaire was the Collective Efficacy scale developed by Hoy and Hoy (2000). One question was selected for this study from the area of peer help. The original and reworded question is located in Appendix D. An example of the rewording is, "The students here just aren't motivated to learn," was changed to, "Students in biology weren't motivated to learn biology making it difficult for me to help them when

we worked together." The alpha coefficient of reliability was strong (.96) regarding self-efficacy.

A final, sixth questionnaire used in the development of the student questionnaire was developed by Glynn and Koballa (2006). Items selected from the Glynn and Koballa instrument include one from self-efficacy and three designed to measure interest in the course. See Appendix D for a more thorough examination of the original items and their rewording to focus more on biology. An example of an original question is, "I put enough effort into learning biology," and the reworded question is, "I believe the effort I put into learning biology was sufficient." The questionnaire developed by Glynn and Koballa has a Cronbach's alpha reading of .93 in each of the areas of self-efficacy and interest.

One additional question was developed for the student questionnaire to measure emotional security (see Appendix D). The item was developed after a review of the literature in student confidence by Hoffman, Badgett and Parker (2008) and Hughes (2006). Both research studies indicated that students, especially females in science classes, participated more in classroom discussions and felt more confident in their responses in single-sex classes. The item in the student questionnaire is, "I felt safer in trying new activities in biology as compared to my other courses." The wording has not changed from the original question. The development of the question resulted from a need to ensure that the scale of emotional security was accurately measured and aligned with the other items in the student questionnaire in regard to emotional security.

The student questionnaire was read and critiqued by the committee members as well as two professors in the Department of Education at Georgia Southern University. Once this was completed and suggestions incorporated, the student questionnaire was

pilot tested to a group of students at the high school used in this study. At the conclusion of the pilot test, three of the questions were changed. The question that read, "Students in biology weren't motivated to learn biology making it difficult for me to help them when we worked together,' was altered to, "I did not often help other students in biology because biology was not interesting." A second question, "When working in the class, I often try to explain the material to a classmate, or have them explain it to me,' was changed to, "When others needed help, I would explain to them what I knew about biology." A third question that originally read, "I try to work with other students from this class to complete the course assignments,' was changed to, "Often I would study with others in biology." All questions were changed in order to clarify possible confusion ambiguity. Also, there were three items that were reversed scored. See Appendix D for details.

The student questionnaire developed for this study was piloted by 12 students at the South Georgia high school in the early part of the semester. None of these students were involved in the administration of the student questionnaire given in the early fall or at the end of the semester. Another question was created after the pilot study. The question was developed after a review of literature by Pintrich, P., et al (1991) and Hoy (2010) in regard to peer help. Both researchers indicated in their studies that single-sex classes promoted peers helping others in regard to the class work. The item on the questionnaire is, "I worked on many biology projects or homework assignments with others in biology." The wording of this question has not changed from the original wording, and was developed to add a greater variety for questions regarding peer help.

The teacher/administrator interview questions (Appendix C) were chosen to add clarity and expertise to the themes established in the student questionnaire. The teacher/administrator interview questions used for this study's interview questions were developed by Jennifer Friend (2006). Friend's study involved the perceptions of males and females in 8th grade biology courses. The setting in Friend's study was similar to this study in that the same male and female teachers taught both the single-sex and coeducational classes, and the questions aligned well with the scales measured in the student questionnaire. The questions in the interview were slightly adjusted for this study so that the same questions can be asked of the 9th grade administrator. An example of one of the original questions from Friend's study the teachers will be asked is, "are there any differences in your instructional methods you use when teaching single-sex classes,' whereas the administrative question will be, "have you observed any differences in instructional methods when you observed single-sex classes."

A Likert scale of one to six was used on the student questionnaire as follows: (1) Strongly disagree; (2) Disagree; (3) Somewhat disagree; (4) Somewhat agree; (5) Agree; (6) Strongly agree. The qualitative data was gathered from the open-ended responses on the student questionnaire in addition to the teacher/administrator interviews. The grounds for using a mixed-method design is so that the judgment about effectiveness of the single-sex classes is not entirely based on test scores, but also on students' motivation and interest, and from teacher and administrator feedback. Using all these data for evaluation provided a deeper understanding all facets of single-sex classes.

Instrument score, reliability, and validity.

Cronbach's alpha was calculated for each subscale (self-efficacy, interest, peer help, emotional security, and participation) since the item wording from the instruments discussed previously have been altered to be more specific to the biology class for the purpose of this study (see Appendix D). These statistics are presented in the results section of the dissertation. The items were randomly distributed throughout the questionnaire so that questions within the same subscale were not in numerical order.

There are two scales that demonstrate poor internal consistency (peer help and participation), and one question (item #12 on the student questionnaire) was deleted in order to have an internal consistency for interest in class of at least .70 (Cronbach's alpha was .65 when item #12 was included in the calculation). Also, a Cronbach's alpha was performed on the scales in early November in order to determine of a test/retest reliability check should be performed. Since two scales (Peer Help and Participation) scored under .70 in the initial analysis as well, a test/retest test reliability test was performed in mid- to late November to determine if certain questions within these scales with low readings would be able to be used individually and have a comparison performed between single-sex and coeducational classes. Twenty students were chosen from an accounting class located in the high school. This class was chosen due to the fact that there was a wide variety of student classifications based on sex, ethnicity, and year in high school. None of these students participated in the actual questionnaire used for analysis in chapter four, and all of the students had taken a biology class in high school, whether at this high school or another high school. The students in the test/retest test were administered the student questionnaire the Wednesday before Thanksgiving break, and again exactly two

weeks later. The results are presented in Table 3 below. To be considered for further study, test/retest reliability must be .70 or better. As shown in the table below, three questions were dropped from the analysis due to test/retest-test reliability. The reasons for not only the poor internal consistency as well as the low test/retest-test reliability could be due to item wording. However, more tests would be needed to confirm these assumptions.

Table 1

Test/Retest Test Reliability for Questionnaire

Item	Scale Measured	Correlation
#3. Biology has opened my eyes to new and exciting jobs.	Peer Help	.28*
#9. I participated frequently in biology even if I did not like what we were doing.	Peer Help	.82
#11. I felt freer to express questions in thoughts in biology as compared to my other classes**.**	Peer Help	.79
#14. I believe the effort I put into learning biology was sufficient.	Peer Help	.79
#4. When others needed help, I would explain to them what I knew about biology.	Participation	.70
#7. I enjoyed studying biology**.**	Participation	.62*
#8. I participated in more class discussions in biology as compared to my other classes**.**	Participation	.68*
#16. I felt safer in trying new activities in biology as compared to my other courses.	Participation	.95

* dropped from analysis

To address content validity of the student questionnaire, the dissertation committee read and critiqued each item to ensure each item aligned with the scale it is intended to measure. At the conclusion of the pilot study, students in the pilot study were asked for suggestions regarding the questions on the questionnaire to ensure the questions are easily read and are clearly understood. Construct validity was further analyzed by showing correlations between subscales behave in a predictable manner. For example, there should be a high positive correlation between self-efficacy, emotional security, and participation in class. There should also be at least a moderate positive correlation between interest and emotional security, participation and interest, and possibly peer help and participation.

Procedure

After all parental permission forms were gathered, the school's instructional coordinator administered the student questionnaire to the spring 2010 coeducational biology students in one of the school's computer labs. This administration occurred in one sitting and took place in mid-November, 2010. On the last day of the semester (December 17, 2010), the instructional coordinator administered the questionnaire to two of the four coeducational and single-sex classes. These latter administrations took place towards the end of the block on the last day of school after the biology final was completed. These were done each block with each class in a school's computer lab separately. Neither this researcher nor the teachers were in the lab while any of the questionnaires were being completed. All questionnaires were completed on the web site *SurveyMonkey*© (Survey Monkey, 2010). For reasons beyond the instructional coordinator's control, the data for the two remaining single-sex classes were not collected

on this date (last day of the fall semester), but were gathered within the first two days of the spring semester 2011 during advisement, which occurs in the middle of the school day.

After the semester, the school's instructional coordinator supplied a spreadsheet with the following data: student listed as male or female, the class setting (coeducational or single-sex), 8th grade CRCT science score, and 9th grade biology EOCT score. These data along with the student questionnaire data were completely anonymous.

On the Saturday following the last day of school, December 18, 2010, the teacher and administrator interviews were conducted. Each interview was conducted at an off-30 minutes, was conducted separately and was audio recorded and transcribed. Before the interviews were used in the data analysis, each transcription was given to interviewees for one final check for accuracy. In controlling confirmability, which is described by Gay, Mills, and Airasian (2006) as assuring neutrality and objectivity, all data will be electronically recorded and stored for possible further research in the field of single-sex classes for five years.

All student questionnaires are completely anonymous, and parental consent forms (Appendix F) were gathered for all students prior to their completing the questionnaire. Appropriate permissions have been gathered from the institution under study (see Appendix H). The teacher/administrator interviews have a recorded informed consent when the interview occurred in addition to a signed consent (Appendix G) that will be kept of file with the rest of the data mentioned above. All data will be kept for at least five years locked in personal storage.

Ethical Considerations

Ethics can generally be defined as how subjects involved in the study are treated (Gay, Mills, & Airasian, 2006). The study involves minors and all possible venues for anonymity will be used. I did not access the state mandated test scores nor administer the student questionnaire. As previously discussed, no students involved in the study had direct contact with me. All questionnaires and test scores were administered and provided by the school's instructional coordinator, thus eliminating such ethical issues as unduly influencing students' answers. All potential harm to students was minimal.

The teacher/administrator interviews followed all Georgia Southern University guidelines regarding protecting the privacy and confidentiality of the teachers interviewed, including a recorded and written informed consent to conduct the interview. The transcripts were typed and stored electronically and were verified with each participant before analysis to determine authenticity and validity. Neither teacher involved was under this researcher's direct supervision, nor was either evaluated by this researcher; therefore, there was no undue influence regarding to the teaching of their classes. Also, both teachers were informed and completely understood that participation in this study had no bearing whatsoever on their employment at the school. These aspects allowed teachers to be completely honest with their responses to the teacher interview prompts, thus adding to the reliability and authenticity of the study. The administrator interviewed is a colleague and is also interested in any viable means of improving student behavior. The analysis of the qualitative data included rich descriptors, including direct quotes when needed, which will allow the reader the ability to identify with the educational setting involved in this study. The research was also

provided to the superintendent of the district used in the study. Finally, to the best of my ability, all data was presented in the results in the most objective format, including tables, descriptors, and tendencies.

Chapter Summary

This study was based on a concurrent mixed-methods design. The objective was to determine the effects of single-sex classes on student achievement (End-of-Course Tests) via test score analysis. Perceptions of the classes were also investigated based on the five scales of self-efficacy, participation, peer help, emotional security and interest in the class from student questionnaires and teacher/administrator interviews. The End-of-Course Tests in the single-sex courses were compared to each other (male and female), to the coeducational classes, as well as analyzed by sex. The student questionnaire open-ended responses and teacher/administrator interviews were used to assess the culture of the classroom based on the five scales to enhance the findings of the test analysis. The research showing the effects of this viable educational setting are minimal, thus the reason for this study.

CHAPTER 4

REPORT OF FINDINGS

The purpose of this study was to determine if there is a relationship between single-sex instruction and student achievement. However, student achievement and proof of learning is not limited to test scores, in this case the state mandated End-of-Course test in biology. An anonymous student questionnaire and teacher/administrator interviews were conducted to determine student achievement as well. The analysis of these areas (EOCT scores, scales of self-efficacy, emotional security, interest in class, peer help and participation) were used to determine the effectiveness of single-sex classes on achievement. The following sub questions will serve to further clarify the study:

1. Is there a difference in student achievement as measured by the End-of-Course Test in Biology between single-sex classrooms and coeducational classrooms, and does this achievement difference vary by student sex?
2. Is there a difference in self-efficacy, participation level, interest in class, emotional security, and peer help between single-sex classroom and coeducational classrooms, and do these differences vary by sex?
3. What are student, teacher, and administrator perceptions of the benefits and challenges of single-sex vs. coeducational classrooms?

Data Analysis Procedures

Analysis of End-Of-Course Tests, self-efficacy, participation, peer help, emotional security, and interest in the class.

One part of the concurrent mixed-methods study was to determine if there was an association between single-sex classes and test scores, specifically the Georgia mandated

EOCT in biology. If there is an association by sex was also analyzed. The two variables in this study are the participation in single-sex or coeducational classes (the independent variable) and the corresponding result on the EOCT (the dependent variable). The EOCT scores were correlated by the instructional coordinator to the students 8th grade CRCT scores and an ANCOVA was run with CRCT scores used as the covariate to statistically equate groups.

A second part of the study was an analysis of the scales of self-efficacy, participation, peer help, emotional security and interest in biology in the student questionnaire. A ratio scale, measures of central tendency for each question, standard deviation for each scale, and an ANOVA for the scales on the student questionnaire was done in order to gain a fuller understanding of the perceptions of the students in single-sex and coeducational classes, possibly offering some plausible suggestions as to the correlation (or lack thereof) between the biology single-sex and coeducational classes and test scores (Gall, Gall, & Borg, 2007). The data was analyzed not only by class setting, but also by sex.

Qualitative analysis of the student questionnaire and interviews.

Qualitative research is the collection, analysis, and interpretation of narrative data in order to gain insights into a particular phenomenon of interest, in this case single-sex classes (Merriam, 2009). The data of the open-ended student questionnaire item and data from the formal-structured teacher/administrator interviews may give valuable insight into the perceptions and opinions of both students and teachers as to the effectiveness, or lack thereof, of the single-sex classes from their real-world experiences. Details from the interviews may bring clarity to the perceptions of the single-sex classes. The teachers and

the administrator were not under my supervision and as a result should be open in their responses to the interview.

In order to provide a clearer picture of the setting of the single-sex classes, data were organized, classified, and categorized as a way to bring order to the data (Gay, Mills, & Airasian, 2006). The interview analysis began with a preliminary list of codes matching the scales used in the questionnaire (self-efficacy, interest, peer help, participation, and emotional security) and was electronically recorded, transcribed, and checked for referential adequacy between the three interviews. The codes were refined and added to as needed as the interviews were analyzed further. These same codes were used initially for the open-ended responses on the student questionnaires. Quotations from the interviews and responses from students were correlated together and used in conjunction with the results of the quantitative analysis from the student questionnaire and test score analysis to add further clarity to the data. The qualitative data were discussed by each scale in the results chapter in the study simultaneously. Unusual or professional terms within the teacher/administrator or student responses were defined in order to bring full understanding to the responses.

Through the process described above, the data were synthesized and conclusions were drawn. These conclusions will help explain the effectiveness, or lack thereof, of the single-sex classes in relation to the quantitative data from the study. Transferability and dependability, according to Gay, Mills, and Airasian (2006), assumes that rich descriptors of qualitative data will be used and the data is stable. As stated previously, these descriptors were used in abundance. Also, quotes from the teachers/administrators themselves in addition to open-ended responses to the prompts on the student

questionnaire were used to convey the meaning of any data. The culture of the single-sex classes was portrayed, and thick descriptions were a necessity to convey this intention. Since pre-determined codes were used to analyze the interviews, stability should be achieved by the themes which arose from all interviews, thus continuing the intention of the portrait of the classroom in rich detail.

Results

End-of-Course Tests.

Student information regarding End-of-Course tests in biology were gathered from students who were in coeducational biology classes either in the spring or fall semesters of 2010, or were in the single-sex classes in the fall of 2010. The classes were not equivalent based on CRCT scores. A statistical analysis of the science CRCT scores, as show in Table 3, shows a difference between single-sex and coeducational classes for both males and females. Interestingly, the CRCT means for both females and males in the single-sex class is roughly 803. There is a statistical difference between the classes, but an ANCOVA was performed on the EOCT scores and helped to statistically account for this difference.

Table 2

Analysis of Setting, Sex, and CRCT Scores

Students	Mean	Standard Deviation	n
Female			
Single Sex	803.17	20.95	54
Coeducational	794.16	22.74	37
Male			
Single Sex	803.14	30.64	51
Coeducational	810.06	24.90	33

Source	SS	df	MS	F
Sex	2638.13	1	2638.13	4.151*
Setting	45.37	1	45.37	.07
Sex X Setting	2657.72	1	2657.72	4.182*
Error	108664.45	171	635.45	

*$p < .05$

CRCT Analysis

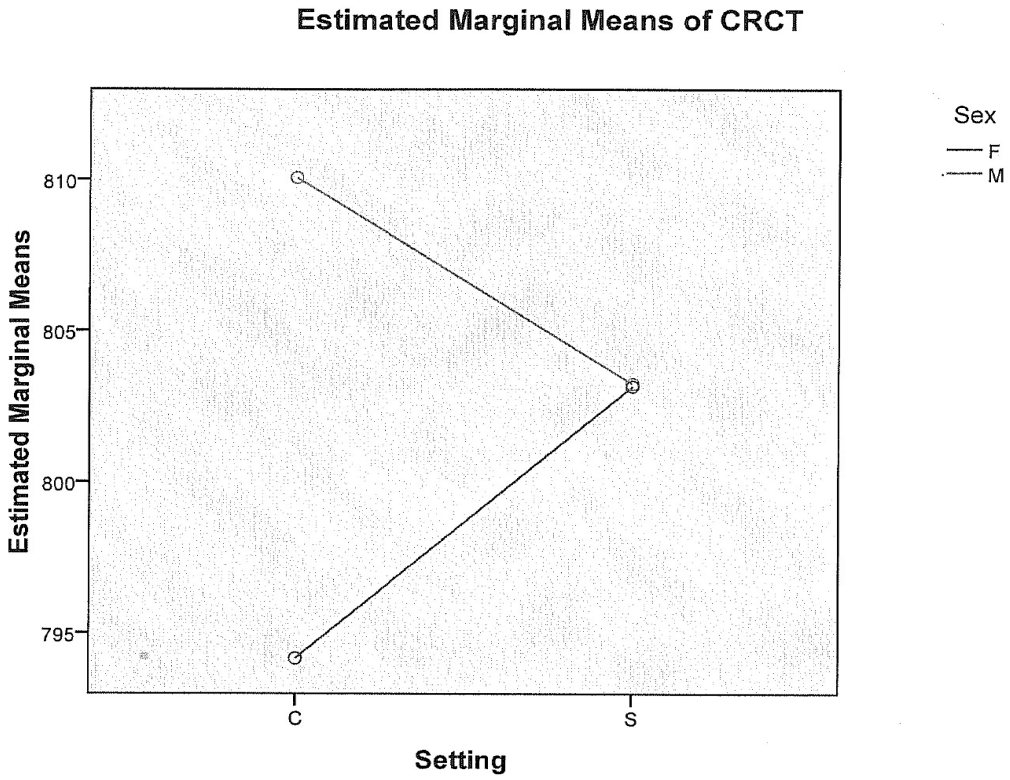

Figure 1: Statistical difference between c classes in CRCT scores between

A careful review of the literature shows females tend to perform better on testing in single-sex classes, but the findings are few and generally not significant. Consistent with prior research, as shown in Table 4 below, there is no significant difference between test scores of single-sex and coeducational classes in this study as well. Even though the data show females in coeducational classes slightly outperform females in single-sex classes, and the opposite is true for male students, once again the findings are not significant ($p = .38$).

Table 3

Analysis of Setting, Sex, and EOCT scores via ANCOVA

Students	Mean	Adjusted Means	Standard Deviation	n
Female				
Single Sex	68.21	70.61	9.42	37
Coeducational	69.58	69.47	8.98	57
Male				
Single Sex	72.38	70.10	9.50	32
Coeducational	72.04	71.84	10.37	49

Source	SS	df	MS	F
Sex	34.58	1	34.58	.77
Setting	3.72	1	3.72	.08
Sex X Setting	83.85	1	83.85	1.88
CRCT	8065.79	1	8065.79	180.61
Error	7591.78	170	44.66	

*p < .05

Student questionnaire analysis.

Self-Efficacy Analysis.

Self-efficacy concerns the self-appraisal of one's ability. The student questionnaire contained four items used to measure this scale. In the questionnaire, the

self-efficacy items were one, five, thirteen, and seventeen. The mean of these items was used to construct the self-efficacy score for each participant.

Table 4

Self-Efficacy Analysis

Students	Mean	Standard Deviation	n
Female			
Single Sex	3.84	0 .99	53
Coeducational	3.98	1.00	29
Male			
Single Sex	4.11	1.24	43
Coeducational	4.77	0 .81	27

Source	SS	df	MS	F
Sex	5.45	1	9.90	9.11*
Setting	3.72	1	5.03	5.03*
Sex X Setting	2.46	1	2.45	2.26
Error	160.85	148	1.09	

*p < .05

The two-way ANOVA, reported in Table 5, shows significant differences between sex and setting. Males, as a whole, believed they performed better in biology than females Also, students in coeducational classes believed they had more self-

efficacy about their ability in biology. There was no significant interaction between sex and setting.

Emotional Security Analysis.

Emotional security deals with the how students feel about taking risks and feeling secure about taking risks in class. Means of items ten, fifteen, and nineteen on the student questionnaire were used to form an emotional security composite. Overall, there were no significant differences for emotional security as a whole between sex, setting, or sex by setting interaction.

Table 5

Emotional Security Analysis

Students	Mean	Standard Deviation	n
Female			
Single Sex	3.65	1.37	53
Coeducational	3.29	1.15	29
Male			
Single Sex	3.47	1.28	43
Coeducational	3.42	1.15	27

Source	SS	df	MS	F
Sex	.02	1	.02	0.97
Setting	1.55	1	1.55	0.01
Sex X Setting	.86	1	.86	0.54
Error	237.66	148	1.61	

*p < .05

Interest in Class Analysis.

Interest in class corresponds to the self-appraisal of the students' perspective on their level of interest in biology after taking the course. A composite mean of items 2, 6, 18 and 20 was used to measure interest in class. However, item twelve was dropped from the analysis in order to create an internal consistency of at least .70 (was .65 before

dropping and .77 after). Taking interest in biology as a whole, there was a significant difference found in sex by setting interaction as shown in Table 7 below. There was an overall greater interest for females in biology in the single-sex classes. However, males had an overall higher interest in biology in coeducational class. Males displayed similar interest levels in both single-sex and coeducational settings; females in single-sex classes had interest levels similar to males, but females in coeducational classes displayed lower interest. Also important to note is that there is a rather large difference between females in coeducational classes as compared to female single-sex, male single-sex, and male coeducational class. One item in this scale was reversed scored. See Appendix D for details.

Table 6

Interest in Class Analysis

Students	Mean	Standard Deviation	n
Female			
Single Sex	3.41	1.06	53
Coeducational	2.92	1.05	29
Male			
Single Sex	3.36	1.28	43
Coeducational	3.66	1.22	27

Source	SS	df	MS	F
Sex	4.14	1	4.14	0 .26
Setting	.36	1	.36	3.04
Sex X Setting	5.41	1	5.41	3.96*
Error	201.94	148	1.36	

*p < .05

Peer Help Analysis.

Peer help is considered as the self-appraisal of the student's perspective on the amount of collaborative learning and group work and learning (Chen, 2002). There were four items on the student questionnaire used to analyze this scale, but due to a low internal consistency, a test/retest test reliability test was performed. After this was done,

item three was discarded due to a low test/retest correlation (.28). Items nine (.82), eleven (.79), and fourteen (.79) scored well enough to be used in the analysis. The analysis in Table 8 shows that there is a difference between studying with others in biology with setting. Coeducational classes worked together more than single-sex.

Table 7

Analysis of Item 9 – I participated frequently in biology even if I did not like what we were doing

Students	Mean	Standard Deviation	n
Female			
Single Sex	3.69	1.74	53
Coeducational	4.34	1.40	29
Male			
Single Sex	3.77	1.48	43
Coeducational	4.33	1.47	27

Source	SS	df	MS	F
Sex	.03	1	.03	0.01
Setting	12.94	1	12.94	5.33*
Sex X Setting	.06	1	.06	0 .02
Error	359.40	148	2.43	

*p < .05

There was a significant difference between educational setting in regard to helping other students. As shown in Table 9, single-sex students generally believed that they helped others in class more.

Table 8

Analysis of Item 11 – I felt freer to express questions in thoughts in biology as compared to my other classes.

Students	Mean	Standard Deviation	n
Female			
Single Sex	3.79	1.62	53
Coeducational	3.10	1.59	29
Male			
Single Sex	3.65	1.67	43
Coeducational	2.59	1.67	27

Source	SS	df	MS	F
Sex	3.74	1	3.74	.24
Setting	26.87	1	26.87	10.01*
Sex X Setting	1.20	1	1.20	.51
Error	397.69	148	2.69	

*p < .05

Overall, as shown in Table 10 below, there were significant differences in item 14 (working with others) between sex and sex by setting interaction. Males believed they worked with each other more than did females. Also, males in coeducational classes believed they worked with each other more, while females in single-sex classes believed they worked with each other more.

Table 9

Analysis of Item 14 – I believe the effort I put into learning biology was sufficient.

Students	Mean	Standard Deviation	n
Female			
Single Sex	3.51	1.41	53
Coeducational	3.41	1.50	29
Male			
Single Sex	3.53	1.44	43
Coeducational	4.33	1.14	27

Source	SS	df	MS	F
Sex	7.86	1	7.86	4.05*
Setting	4.35	1	4.35	2.24
Sex X Setting	7.03	1	7.03	3.63*
Error	286.98	148	1.94	

*p < .05

Participation Analysis.

Participation, for this study, is the self-appraisal of a student in how they engage themselves in class discussions and other learning opportunities. There were four items used to measure this scale: items four (.70), seven (.62), eight (.68), and sixteen (.95). However, since the internal consistency of this scale using Cronbach's alpha was low (.43), a test/retest test reliability test was performed. Items seven and eight were dropped due to a test/retest correlation being lower than .70. The findings in Table 11 and Table 12 show that there is no significant difference between sex, setting, or sex by setting interaction in either item four (Table 11) or sixteen (Table 12). In fact, as shown in Table 12, there is little difference at all between setting and sex by setting interaction for item sixteen. However, the means for all variations (sex, setting, and sex by setting interaction) were at a minimum of 3.50, which means all areas leaned more toward participating than not participating. One item was reversed scored. Seen Appendix D for details.

Table 10

Analysis of Item 4 – When others needed help, I would explain to them what I knew about biology

Students	Mean	Standard Deviation	n
Female			
Single Sex	3.06	1.66	53
Coeducational	3.41	1.74	29
Male			
Single Sex	3.49	1.64	43
Coeducational	3.33	1.62	27

Source	SS	df	MS	F
Sex	1.09	1	1.09	0.39
Setting	.36	1	0.36	0.13
Sex X Setting	2.31	1	2.31	0.84
Error	408.61	148	2.77	

*p < .05

Table 11

Analysis of Item 16 – I felt safer in trying new activities in biology as compared to my other courses

Students	Mean	Standard Deviation	n
Female			
Single Sex	3.94	1.65	53
Coeducational	4.31	1.69	29
Male			
Single Sex	4.09	1.60	43
Coeducational	4.04	2.13	27

Source	SS	df	MS	F
Sex	0.14	1	0.14	0.04
Setting	0.85	1	0.85	0.26
Sex X Setting	1.57	1	1.57	0.48
Error	485.63	148	3.28	

*p < .05

Student Open-Ended Response Analysis

Students who had taken the coeducational classes in biology in either spring 2010 or fall 2010 in addition to the students who took the single-sex classes in the fall of 2010 were given the opportunity not only to take the questionnaire analyzed above, but also

were given the chance to add comments to any question they wished, and answer one open-ended response at the end of the questionnaire. The question asked them to add any comments about likes, dislikes, concerns, or suggestions regarding single-sex and coeducational classes.

Many of the comments concerning the likes and dislikes of the biology classes were simple statements, such as "it was fun," or "I hated biology" which were coded as interest in the class. There were, however, a few comments that gave some insight to the culture of the class for certain students; also, there was a distinct difference between the typical comments from single-sex classes and coeducational classes. Some of these comments are explored below. All comments are located in Appendix L.

Typical self-efficacy comments were similar in nature to the quotation from a female student who stated, "I did learn some things." Typical interest statements, besides the ones stated above, include such comments as, "Biology was ok…at times I did enjoy it." Emotional security was more prevalent in the quotes from the females in single-sex classes and were similar to one female student who stated, "I felt like I could talk about more things in this class." Statements that centered on ideas such as, "some days I just didn't know what to do," were coded as participation. Peer help items, though few in number, were similar in nature to the female who stated in single-sex classes that the girls, "teamed up and got it done." There were a few statements that were coded as being relevant to more than one scale, but this was due to them being a compound sentence with two distinct thoughts. An example of one such statement is "I felt more open because I like that it was all girls" which was coded for both emotional security and interest in class. The table below shows the frequency of each coded response.

Table 12

Open-Ended Responses for Student Questionnaire

		Number of times referenced	
Scale	Percentage of Respondents	Positive % (#)	Negative % (#)
Self-Efficacy	19.7 (30)	50.0 (15)	50.0 (15)
Interest	59.9 (91)	48.4 (44)	51.2 (47)
Emotional Security	4.6 (7)	85.7 (6)	14.3 (1)
Participation	7.2 (11)	1.8 (2)	98.2 (9)
Peer Help	2.0 (3)	66.7 (2)	33.3 (1)
Total	142 comments	48.6 (69)	51.4 (73)

Positives.

There were only a few comments from the coeducational classes that labeled the biology classes in a positive way. Most of these comments labeled the teacher, not the course or setting, as what the student enjoyed. Examples include "I loved Ms. XXX's class," or "...I had a pretty cool teacher," or "Mr. XXX made the class fun." No positive comments were included in any of the coeducational class responses about the setting of the class. However, this could be due to the fact that these students had never had an alternative educational setting, such as single-sex, so they would not know that setting could be an option.

In regard to the single-sex classes, there were positive comments concerning setting; however, most of the comments came from females. More than once, females

stated positive beliefs or feelings concerning single-sex classes. Some of the comments included such statements that described the setting as a more open and safe place to speak for females. Examples included such statements as, "I felt more open because it was all girls," and "with all the girls it was easier to discuss things without the immaturity of the males," and "I like the [single-sex] class, not only does it help you focus, but the girls can say things when guys are not around. Biology is very fun," and "the single sex class is alright." However, there were a smaller number of comments from the male single-sex class that echoed the ideas of the female class. One such comment was, "it's cool having a class full of boys. You can say some things that girls wouldn't understand." Similar statements show that the setting made a difference in how the students, mainly females, viewed the culture of the class.

Other positive comments, mostly from females, concerned learning as a goal. One such comment sums the majority of these types of statements: "I thought I learned more by being in an all-girls class." Others mimicked this idea by stating being in a single-sex class "helped" the students learning goals. One female stated that "I learned more by being in an all-girls class." One statement even points to the team concept that single-sex classes can create. One female, in articulating her thoughts on single-sex, stated that, "the girls teamed up and got it done." In all, there were four times as many positive comments concerning the biology classes from single-sex responses as there were coeducational responses.

Negatives.

Negative comments were contained in the responses from both the coeducational and single-sex classes. Most of the negative comments from the coeducational classes

included phrases such as “I hate biology,” and “I am never going to do anything that involves biology.” These two comments were the main focus point of the majority of the negative comments obtained from the coeducational classes. There were a few, however, even more extreme. More than once, a student from a coeducational class stated that the class was the “worst” class at XXXXXXXX High School. There was no such comment as this in the single-sex student responses.

However, the negative comments from the single-sex classes, even though a small number mimicked those above, focused their rationale on a different point. One such comment, “It was not fun, but I did learn some things” summarizes these points. Students in single-sex, even though criticizing the class, did so in a less extreme manner. The word “hate” was used only once, and as a whole extreme negative words were used many fewer times than in the coeducational classes. Even those who stated they did not like the biology class, possibly due to not liking science or school as a whole, stated that “it was OK compared to [the students] other classes,” and “it was an experience I am glad I had, but don’t know if I want to do it again.” One male student responded similarly to what the research stated as to why some males do not like single-sex classes. He stated “it was boring because there were no girls to stare at.” Overall, there were three times as many negative statements about biology from coeducational students as there were single-sex students.

Teacher and Administrator Interviews Analysis

The female and the male teacher as well as the 9th grade administrator were interviewed at the conclusion of the fall semester. The interviews were recorded, transcribed (see appendices I, J, and K) and analyzed according to the themes of the

scales of the questionnaire. These themes are self-efficacy, emotional security, participation, peer help, and interest. These themes appeared within statements given by the teachers and administrators, and no other themes emerged with any significance in the interviews. The theme which appeared the most was emotional security. The others appeared, but to a far lesser degree. The teachers had the most definitive statements about single-sex classes. The administrator's thoughts were essentially nondescript, other than to say she does not approve of single-sex classes.

Emotional Security.

Contained within the interviews of the male and female teachers were twenty-two statements which were coded as dealing with emotional security. Of the twenty-two statements, more than half were from the female teacher. There were no statements from the administrator dealing with emotional security.

Many of the statements concerning emotional security from the female teacher concerned a "safe" place for female students to work, learn, and most definitely a place to share ideas. "Girls tend to do more than in a mixed classroom" and "I think I give them a safe person, or a safe female, to ask a question." Both of these statements were contained in answers where the teacher was describing how she was trying to build relationships with the female students. The female teacher did believe she was making a difference in the students lives and worked hard to make sure that the impact was positive, even going so far as to use quotations from famous females, such as from Eleanor Roosevelt ("You gain strength, courage, and confidence by every experience in which you really stop to look fear in the face. You are able to say to yourself, 'I lived through this horror. I can take the next thing that comes along.' You must do the thing you think you cannot do")

and Althea Gibson, tennis champion ("No matter what accomplishment you make, somebody helped you"). She uses these in class bell-ringer activities as often as she could to give the students positive role models for them to admire. For the students themselves, the female teacher stated the female students in a single-sex class "shared their personal experiences" and "perspectives" more than in a coeducational class. Part of the reasoning for this, from the female teacher's perspective, is "building the relationships and possibly wanting to please the teacher," would make the female students feel more at ease in class, thus allowing them to open up their private lives and experiences more in class, which would in turn deepen their learning. She even went as far as saying even though she has tried to broaden her relationship building with the male students she has, there is "something there" she does not have with the male students.

The male teacher expressed some thoughts and ideas concerning emotional security, though to a lesser degree than the female teacher. However, one key similarity deals with the idea of building relationships. Echoing the thoughts of the female teacher, the male teacher stated "relationships play a huge role in my teaching." He believes if teachers build the relationships, the students in turn would do anything to please them. In addition, reiterating the thoughts of the female teacher, the male teacher believes he has connections with male students that he does not have with female students. He explains this by stating "I've dealt with those emotions. I've been through puberty. You know I've done all that kind of stuff;" therefore, he is drawing upon his own personal experience to in turn help those who are experiencing what he has gone through. Later in the interview, the male teacher echoes once again the beliefs of the female teacher concerning emotional security. He states "having a male that, one, cares about them and

two, can depend on where that relationship comes in, really kind of feeds to them…" He also states males from a low socioeconomic household are often raised by mothers and grandmothers, thus creating a void where a strong male role model is needed. He believes that a single-sex classroom can help build positive relationships and help fill this void.

In summary of emotional security, both the male and female teacher believe single-sex classes aid in promoting emotional security to their students, and each takes that responsibility seriously. Each believes single-sex classes allow students to open up their personal experiences and build relationships with adult role models to a much higher degree than could be done in a coeducational class. Each also believes this is in part to being of the same sex as the students, and in part to sharing similar experiences with the students when they were young.

Self-Efficacy.

The compilation of the three interviews totaled twelve statements concerning the area of self-efficacy. One came from the administrator who stated she expects all students to learn "regardless of the setting." The rest came from the teachers, essentially equally.

The female teacher believes self-efficacy is related to how she builds relationships and by making learning relevant to the students, she can help them increase not only their learning, but also their desire to learn. She states she believes the girls "leave the class with a little more understanding." The male teacher, on the other hand, discussed the ideas of self-efficacy in regard to the male classroom not having the distractions (i.e. females, partially) of the coeducational classroom, thus being able to focus the learning

more. He goes further by stating the design of the single-sex classroom may not be for everyone, but it can help those it is designed for while at the same time not hindering those who would succeed in a coeducational classroom. He states, "If you have a class of thirty kids and the class is designed for the six [that need the single-sex classroom], the others are still going to learn. It is about saving those six."

Interest.

The area of interest in the interviews produced nine statements. The administrator's only comment concerning interest was that she believed that she is to be a motivator to teachers and students to learn, thus sparking interest in school and learning. Each teacher had four statements concerning interest within their interviews.

The area of interest, in both teachers' beliefs, related closely to emotional security. To sum the notion of these two themes being interwoven, a quote by the male teacher will suffice: "…they've got to feel that it matters. If I can build that relationship with that kid, then many of the things I say have more merit. If I tell them something is important, then it in turn becomes important because of the relationship I built." The female teacher's responses were similar in thought. She believes her goal is to spark "interest" in science, and the relationships add merit to her attempts to do so. Both teachers stated they thought the single-sex classes were "fun" and that they "liked the same sex classes."

Participation and Peer Help.

Participation and peer help were discussed twelve times throughout the interviews. Interestingly, even though the administrator does not approve of using single-sex classes in high school ("they are not real world. We've got to learn to get along with

everybody…"), she did state communication was more prevalent in single-sex classes. However, she also stated that she did not believe all the communication was necessary, and some discussions did tend to lead in different directions that would lead away from the learning topic. As for the teachers, the female teacher had far more comments concerning participation, though not always positive, than did the male teacher.

The male teacher's comments concerning participation and peer help dealt with the idea of using competition to drive learning. Whether it was in a lab activity or a regular class activity that has some competition interwoven, the males, in his opinion, tend to be "more inclined to focus on the task at hand, to be more successful." The female teacher, however, discussed the idea of participation in regard to discussions. She believes that girls tend to "do more when it is not in a mixed classroom," including more discussions.

However, not all comments concerning participation were positive. The female teacher stated that since the girls, in her opinion, do feel safer in class, they could also feel safer in talking back to her, and discussions would sometimes get out of hand due to the verbal nature of girls the girls trying to talk at the same time. In one of her single-sex classes, she did not get the "right mix of students," thus creating attitudinal issues between girls. She also believes that even though some of the discussions are worthwhile and the girls do understand more afterwards, they are not meaningful when answering questions on the End-of-Course Test in biology.

Chapter Summary

Some of the results followed the patterns of single-sex classrooms as found in the literature, while some did not. Tests scores, though slightly higher for males in single-

sex classes and slightly higher for females in coeducational classes, were not significantly different, either between sex, setting, nor sex by setting interaction. The student Likert-scale responses on the student questionnaire were varied in there results as well. Using an acceptable p-value of less than .05, a few of the scales tended to show a higher satisfaction with single-sex classes (emotional security, interest for females); others showed either a higher satisfaction with coeducational classes (self-efficacy, interest for males) or none/mixed results (participation, peer help).

The qualitative responses from both the students and teachers, however, showed more satisfaction with single-sex as a whole. The teachers would very much like to teach the single-sex classes. They believe they can build better relationships with the students and affect student learning in a much more positive way with single-sex classes. Students, even though most of the comments were one to two sentences, generally believe they felt safer in class voicing their opinions. Even though they may not want to take another science course, students believed that they did learn, and in some cases, more than they do in a regular class. Even the negative comments concerning biology in the single-sex class were much more ambivalent towards the class than the negative comments in the coeducational class, which tended to be harsher.

Table 13

Significant Findings

Test Scores	No difference in test scores between setting
Self-Efficacy	Males are higher; coeducational setting is higher
Interest in Class	Females were higher in single-sex; males overall higher
Peer Help	Coed works with others more; single-sex helped others more; Males overall, females in single-sex worked with others more

CHAPTER 5

CONCLUSIONS AND RECOMMENDATIONS

The intent of this concurrent mixed-methods study was to analyze the effectiveness of single-sex instruction on student achievement. In the study, standardized test scores were used to measure the relationship between type of classes (coeducational or single-sex), the independent variable, and student achievement, the dependent variable. For the purpose of this study, student achievement was defined as a standardized test score on the Georgia End-of-Course Test in biology. At the same time, perceptions of the impact of type of classes on student achievement and engagement was explored using student questionnaires and teacher/administrator interviews at the high school in South Georgia. The reason for combining both quantitative and qualitative data was to gain a richer understanding of the culture of single-sex classes.

The End-of-Course Test in biology was analyzed for differences between sex, setting, and sex by setting interaction for 175 students at the high school in South Georgia who took coeducational biology in the spring of 2010 or the fall of 2011, or took single-sex biology in the fall of 2010. Also, 152 students who were in the coeducational biology class in spring or fall 2010 or single-sex biology 2010 participated in the student questionnaire used to analyze the differences in perception for biology between sex, setting, and sex by setting interaction. This was an 86.8% participation rate. The student questionnaire was also designed to include open-ended responses that were analyzed qualitatively and concurrently with the teacher and administrator interviews. This researcher used the quantitative and qualitative results to determine the effectiveness of

the single-sex classes in the school. The design of the study was to not have standardized tests as the only tool for measuring the effectiveness of the classes.

The following research question was used to guide the study: Is there a relationship between the type of class (single-sex or coeducational) and student achievement? In addition, the following sub questions will serve to further clarify the study:

1. Is there a difference in student achievement as measured by the End-of-Course Test in Biology between single-sex classrooms and coeducational classrooms, and does this achievement difference vary by student sex?
2. Is there a difference in self-efficacy, participation level, interest in class, emotional security, and peer help between single-sex classroom and coeducational classrooms, and do these differences vary by sex?
3. What are student, teacher, and administrator perceptions of the benefits and challenges of single-sex vs. coeducational classrooms?

Current Research on Single-Sex Classes

Single-sex classes, once a staple of the US education system, was all but outlawed with Title IX in the early 1970s. With No Child Left Behind (2001), single-sex classes were once again given a chance in schools. However, since this is a new venture, the research is limited and mixed at best. Some research shows positive results from instituting single-sex classes, but other research shows negative effects. Also, a majority of this research is for middle schools, which is one of the reasons this researcher wanted to study the effects in high school in hopes of determining a method that could be used to help achieve the adequate yearly progress (AYP) needed to meet the requirements of

NCLB. The seminal research performed by Mael et al (2005) with their findings showing more research needed to be done to determine the effectiveness of single-sex classes, along with the two science teachers bringing the idea of single-sex classes to the administration of the high school in South Georgia, an opportunity arose to add to the limited body of research concerning this educational alternative.

Discussion of findings and implications

Test Scores.

The analysis of the EOCTs in biology for the coeducational and single-sex classes showed that there was little difference between the test scores of males in coeducational or single-sex classes. The same was true for females in both settings. Even though there are some studies that describe female test scores improving in single-sex science classes, this was not the case for this study. Many possible reasons for this finding are possible, one of which is that the single-sex classes do not improve test scores based on setting alone. However, there are other reasons as well.

Teachers are one of the most important factors in determining student success, regardless of setting. The two teachers in the classroom could have been the driving force between student success and failure. Other reasons include the make-up of the class. The female teacher pointed to the possibility one of her classes this semester seemed to be more difficult to control, leading to issues inside the classroom could produce lower test scores. Without knowing which scores came from which class, it would be impossible to show a difference between these classes, but could be done with test scores divided by each separate class and could be the basis of future analysis.

Another possibility is even though the analysis was run with a covariate (since the CRCT scores showed that the groups in each setting were not equivalent before the analysis) there could have been other mitigating forces caused the test scores to remain similar and show no positive results in either setting. Some of these factors include the racial and ethnical make-up of the class, socioeconomic status, inclination towards science before testing, and grouping of students who are served by special education. However, it is very important to note even though the test scores showed no tendencies toward single-sex classes improving test scores, it also did not show they declined. This finding is noteworthy because the success of single-sex classes may not lie in the test scores, but in other factors in the class that could lead to higher understanding, such as discipline disruptions or involvement in class activities or discussions. This could be tested in future studies by including more than one test, such as classroom benchmark and final tests which includes more than the standard multiple choice questions on the EOCT. The make-up of the tests could include short answers, essays, and fill-in-the-blank. The reason for the different style of testing is to give a more thorough understanding of what type of assessment may or may not favor single-sex or coeducational classes. These test scores can then be compared and analyzed.

Another reason may be that single-sex classes are a place where students have a trusted adult they can go to in times of need, or to have someone to emulate or have a role model. This is a good reason to have the single-sex classes. As the male teacher was quoted earlier, "it's about saving the six," meaning the ones who excel more in single-sex than in coeducational classes for various reasons and need single-sex classes in order to reach a higher level of achievement while concurrently not harming the others in the

class. In other words, single-sex may not cause growth in all students, but it does not show a decrease either. If the data can be organized by quartiles, growth can be determined by groups of students and not just the students as a whole. Future studies could analyze test scores not only by group, but also by quartiles within test groups so that growth could be determined by lower and higher achieving students, not just students as a whole.

Student questionnaire and interview analysis.

The student questionnaire was administered to 152 students who were in the coeducational classes in the spring or fall of 2010 and the single-sex classes in the fall of 2010. The numerical analysis presented in chapter four brings some interesting results. Some of the findings point to coeducational classes, and some point toward single-sex classes. The discussion for each of the five scales (self-efficacy, emotional security, participation, peer help, and interest) are below.

Self-efficacy.

Generally speaking, males believed they had more self-efficacy towards biology classes, taking into consideration the teacher and difficulty of the class, than females believed. However, in most classes, males generally participate more in science classes than do females, so this finding was not surprising.

Another finding was the coeducational classes generally believe they had more self-efficacy in biology than the single-sex classes did. This finding is a little surprising in that since most students believed they participated more in single-sex classes, thus one would assume students believed they performed better in single-sex classes, but the opposite was true. The statements from students in their open-ended responses pointed to

this as well. Female and male students stated they "learned more" and "teamed up and got it done" in single-sex classes, so the finding of coeducational classes believing they performed better is somewhat surprising. One conclusion could be students in single-sex classes had more in-depth discussions in class (according to the qualitative data from students and teachers), thus realizing biology was much more involved than the knowledge and comprehension level of Bloom's taxonomy. If more involved, one would not feel as confident about doing as well. However, more discussion would lead to more thorough understanding, but at the same time, a greater understanding that there is more to learn in the subject.

Emotional Security and Interest.

Students in single-sex and coeducational classes, overall, did not show any significant differences except in one area, and that is in setting. Students in single-sex classes believed they felt freer to express thoughts and questions than did those in coeducational classes, which follows much of the literature on the subject. Many statements from students concerned feeling freer to talk in class, such as "I felt more open" or "you can say some things" in single-sex classes as opposed to coeducational classes. In fact, there were more students who responded about emotional security and interest (and many interest statements were in the area of "liking" the biology class, specifically single-sex, leading one to believe they liked it due to feelings of security) than in any other area, thus leading to the conclusion these were the most important areas to students. Corresponding to this is the fact the teachers talked about emotional security more than in any other area as well. Both the male and female teacher discussed notions of building relationships and using those relationships to promote and nurture student

achievement. The male teacher believed by creating a strong relationship with students, the students would then in turn trust if the teacher said something is important, they would believe it is important. One conclusion which can be drawn is that single-sex classes provide a viable alternative to coeducational classes where students do improve their learning opportunities by feeling freer and more open to ideas, discussions, and the teachers themselves. However, it is important to note female students were with the female teacher, and male with males. Both teachers believe they are able to make connections, emotionally and psychologically, with their same sex more than they can with the opposite sex. If someone believes something, it can become true for that person simply due to believing it; therefore, if the teachers believe they can make better connections, and students believe they feel freer to express themselves, the connection is proven. Also, as stated before, if the discussions are more in-depth and the students do believe something is more important due to the fact the connection, or relationship with the teacher, is strong, then learning moves from comprehension to evaluation and synthesis much easier than in regular educational settings.

As found in most of the literature, males generally liked the biology classes more than did females. However, males in single-sex classes did not want to take another biology class. This can possibly be illustrated by a quote from a male student, who said there were "no girls to look at" in class. Females in single-sex classes, even though they were not extremely enthusiastic about taking another biology class, were more open to the idea. Overall, females in single-sex classes had a much higher interest in biology than those in coeducational classes, and the reverse was true for males. Many of the statements from students concerned interest, though even the negative comments from

single-sex classes were less negative in nature than those in coeducational classes. One female stated she did not like the setting (single-sex) but she felt she learned something. The teachers, according to their interviews, believed creating interest was very closely tied to their relationships they built with the students, which is how they "spark" interest in class. Some literature points to findings of females having a stronger interest in the subject matter when in single-sex classes, and this study supports those findings. One reason could relate back emotional security. If females feel freer to express themselves in single-sex classes, leading to more thorough discussions, interest in the class is bound to follow. Having a stronger interest in a subject can lead students to want to follow a career in that subject. This was one of the goals of the female teacher, to "spark" the interest of her female students. As emotional security grows, interest will be the direct result. As predicted, these two scales have a positive correlation.

Participation and peer help.

Correlations were found between these two scales as well as between interest and participation. As a general finding, students in coeducational classes tended to believe they studied with each other more than students in single-sex classes, but this does not tell the whole story. Studying encompasses many avenues, and would not mean discussions. As shown above, if discussions were more prevalent in single-sex classes, then studying together in class would not occur as much simply because of time.

Another area of interest is with item eleven which concerned helping others. Students in single-sex classes believed they helped each other more in class than did students in coeducational classes. This finding correlates well with emotional security when students feel secure in class, they will work with others more so than when they

feel uncomfortable with sharing personal experiences or asking questions. In fact, this finding was one of the most significant in the study ($p = .002$). Some literature points to the same finding, especially in regard to females. However, this study points to the fact males did as well. Since females are generally regarded as better at working cooperatively, this finding, males also helped their classmates, is important.

Item fourteen concerned working with others in projects in biology. Once again, males believed they worked with others more so than females. This is also very important for the same reason described above. Females generally work well together, so having males believe they worked together more so than females is significant. Overall, females in single-sex classes believed they worked together more than females did in coeducational classes. This shows a positive correlation between peer help and interest as well as emotional security in this area. This idea is summed up by a quote from a female student who stated "the girls teamed up and got it done," showing that the females in single-sex worked better together.

Participation showed no significant differences in any area. However, this also could be positive in that in some cases males tend to dominate discussions and activities in science (almost a "boys with toys" type atmosphere). In this study, there was no difference, meaning the females believed they participated equally as the boys believed. This could imply an increase in female participation since females, generally speaking from the literature, do not participate as much as boys in science and math classes.

Conclusions

This researcher framed this study in such a way as to evaluate the effectiveness of single-sex biology classes in the high school in South Georgia. This researcher also

framed the study so that test scores are not the only data on which to rely for evaluation. From the analysis of the data, there are a few conclusions that have been drawn in regard to single-sex classes.

1. The data showed no differences in test scores. Even though the data can be disaggregated to illuminate more about the results, there is an important note: there were also no declines in test scores based on the covariate CRCT scores. This implies that even though single-sex classes may not improve test scores, in this case it did not decrease test scores as the teachers' scores were very close to their own personal best (as far as pass rates).
2. Female students believe they were freer to discuss items of a more personal nature in class when there are no males in the room. Also, both teachers believed they were able to build stronger relationships with students in the single-sex classes than in coeducational classes. This means single-sex classes for females lead to more in-depth discussions, which, in turn, could move students from the basic knowledge and comprehension level, to being able to evaluate and apply the information to their own personal lives in a more substantial way.
3. Generally speaking, students help other students more in single-sex classes than in coeducational classes. This is more than likely due to a combination of emotional security felt by students, and the teachers' belief the students can work together more, possibly giving the students more opportunities to work cooperatively.
4. The mix of the class can have a major effect on the measure of effectiveness on a classroom setting. The female teacher stated that of her two single-sex classes,

there were major attitudinal differences, creating a harder-to-deal-with class in one block as opposed to the other.

Implications and recommendations.

In this study, single-sex education did seem to be effective in a variety of ways. Though students in single-sex classes did not score significantly higher than those in coeducational classes, they did not score significantly lower either. This means students who perform at a certain level in coeducational classes would probably perform just as well on the standardized state EOCT in biology if placed in a single-sex class. With this in mind, the overall effectiveness of the single-sex biology class seemed to be at least moderately high since there were a variety of measures which did seem to improve in single-sex classes. These measures include but are not limited to emotional security and interest for females, peer help, especially for males. Males also seemed to enjoy having the male role model, even though many would not want to take another one. Males generally enjoy having the female sex around, especially at this time of life (younger pubescent), and females enjoy the time away from the males.

It is this researcher's recommendation that single-sex classes have a positive impact and can affect student achievement. Test scores did not increase in single-sex, but also did not decrease. Since there are a variety of other ways single-sex classes improved learning without hindering others, the idea of single-sex classes seems to be a viable educational alternative to coeducational classes. This could be one avenue to help those who need fewer distractions. However, schools must be cautious in attempting to implement the single-sex initiative and teachers must be open to the

idea, realize single-sex classes with the same sex teacher seem to do better than opposite sex grouping of students to teachers, and that the classes do not need to become a dumping ground for all the lower level students or those with discipline problems. A mix of ethnicity, socioeconomic background and learning levels seems to work best.

This researcher also believes that future research can be done using the data contained in this study, as long as the data can be grouped by test quartile scores to analyze if one quartile in a particular setting may have improved more than in the alternative setting. The current student questionnaire could also be given with some slight modifications for those questions with low test/retest-test reliability, and could be analyzed as the test scores are, based on quartile rankings of testing, and also by socioeconomic status. However, in this high school, low socioeconomic status has a strong correlation with lower achieving students. A final recommendation would be to study the effectiveness of single-sex classes on upper level classes, possibly honors classes, to see if they have any effect, either positive or negative. This could be done to see if interest for females improves dramatically or not in order to have more females chose science as a possible course of study in post-secondary education.

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APPENDIX A

IRB APPROVAL

Georgia Southern University
Office of Research Services & Sponsored Programs

Institutional Review Board (IRB)

Phone: 912-478-0843 — Veazey Hall 2021, P.O. Box 8005
Fax: 912-478-0719 — IRB@GeorgiaSouthern.edu — Statesboro, GA 30460

To: Robert Costlow
221 Pretoria Rushing Road
Statesboro, GA 30461

Paul Brinson
P.O. Box 8131

CC: Charles R. Patterson
Vice President for Research and Dean of the Graduate College

From: Office of Research Services and Sponsored Programs
Administrative Support Office for Research Oversight Committees
(IACUC/IBC/IRB)

Date: September 10, 2010

Expiration Date: March 1, 2010

Subject: Status of Application for Approval to Utilize Human Subjects in Research

After a review of your proposed research project numbered **H11044** and titled **"A Case Study of Single-Sex Biology Classes in a High School in South Georgia."** it appears that (1) the research subjects are at minimal risk, (2) appropriate safeguards are planned, and (3) the research activities involve only procedures which are allowable. You are authorized to enroll up to **200** subjects.

Therefore, as authorized in the Federal Policy for the Protection of Human Subjects, I am pleased to notify you that the Institutional Review Board has approved your proposed research.

This IRB approval is in effect for one year from the date of this letter. If at the end of that time, there have been no changes to the research protocol, you may request an extension of the approval period for an additional year. In the interim, please provide the IRB with any information concerning any significant adverse event, whether or not it is believed to be related to the study, within five working days of the event. In addition, if a change or modification of the approved methodology becomes necessary, you must notify the IRB Coordinator prior to initiating any such changes or modifications. At that time, an amended application for IRB approval may be submitted. Upon completion of your data collection, you are required to complete a *Research Study Termination* form to notify the IRB Coordinator, so your file may be closed.

Sincerely,

Eleanor Haynes

Eleanor Haynes
Compliance Officer

APPENDIX B

STUDENT QUESTIONNAIRE

Single-Sex Classes

XXXXX High School

PURPOSE

The purpose of this questionnaire is to evaluate the effectiveness of the biology classes at XXXXXXXX. This survey is *completely anonymous* – please do NOT put your name on this survey. You may stop answering questions at anytime during this survey, and you do not have to answer any question you do not wish to answer. *Completion and return of the questionnaire implies that you agree to participate and your data may be used in this research.* If you do not understand any question, please ask the administrator giving the survey to explain what is meant by the question.

DIRECTIONS

Please circle a response in which you feel you have adequate information to make a judgment. If you do not feel you have adequate information, please circle NA for 'not applicable'. The ranking system is as follows:

1 – Strongly disagree
2 – Disagree
3 – Somewhat disagree
4 – Somewhat agree
5 – Agree
6 - Strongly Agree
NA – Not Applicable or not enough information to answer

No names will be included, so feel free to say what you wish.

1	**Were you in a single-sex or coeducational class?**	**Single**				**Coed**		
2	**I believe I did well in biology.**	**1**	**2**	**3**	**4**	**5**	**6**	**NA**
3	**Biology has opened my eyes to new and exciting jobs.**	**1**	**2**	**3**	**4**	**5**	**6**	**NA**
4	**When others needed help, I would explain to them what I knew about biology**.	**1**	**2**	**3**	**4**	**5**	**6**	**NA**
5	**Sometimes I participated less in biology as compared to my other classes because I did not know what was going on.**	**1**	**2**	**3**	**4**	**5**	**6**	**NA**
6	**I am certain that I understood the basic concepts taught in this course.**	**1**	**2**	**3**	**4**	**5**	**6**	**NA**
7	**I enjoyed studying biology.**	**1**	**2**	**3**	**4**	**5**	**6**	**NA**

8	**I participated in more class discussions in biology as compared to my other classes.**	**1**	**2**	**3**	**4**	**5**	**6**	**NA**
9	**I participated frequently in biology even if I did not like what we were doing.**	**1**	**2**	**3**	**4**	**5**	**6**	**NA**
10	**Often I would study with others in biology.**	**1**	**2**	**3**	**4**	**5**	**6**	**NA**
11	**I felt freer to express questions in thoughts in biology as compared to my other classes.**	**1**	**2**	**3**	**4**	**5**	**6**	**NA**
12	**I did not often help other students in biology because biology was not interesting**.	**1**	**2**	**3**	**4**	**5**	**6**	**NA**
13	**I cannot see why some people devote their lives to the study of plants and animals.**	**1**	**2**	**3**	**4**	**5**	**6**	**NA**
14	**I believe the effort I put into learning biology was sufficient.**	**1**	**2**	**3**	**4**	**5**	**6**	**NA**
15	**I worked on many biology projects or homework assignments with others in biology.**	**1**	**2**	**3**	**4**	**5**	**6**	**NA**
16	**I felt safer in trying new activities in biology as compared to my other courses.**	**1**	**2**	**3**	**4**	**5**	**6**	**NA**
17	**I participated equally with my lab partners when we did dissections.**	**1**	**2**	**3**	**4**	**5**	**6**	**NA**
18	**Considering the difficulty of this course, the teacher, and my skills, I think I did well in this class.**	**1**	**2**	**3**	**4**	**5**	**6**	**NA**
19	**The biology I learned was relevant to my life.**	**1**	**2**	**3**	**4**	**5**	**6**	**NA**
21	**I felt safe in biology as compared to my other classes.**	**1**	**2**	**3**	**4**	**5**	**6**	**NA**
21	**I would like to take another biology related class.**	**1 = Yes**					**2 = No**	
22	**Sex**	**Male**					**Female**	
23	**Age - please circle your age in years**	**14**		**15**			**16**	**17**
24	**Please circle your year in high school**	**1st year**					**2nd year**	
25	**Do you recall your EOCT score? If so, please put here**	**Score =**						
26	**Please state any thoughts you had about biology. Was it fun? Did you enjoy it? Do you think that being in a single-sex or coeducational class helped you learn more? All thoughts are welcome…**							

Thank you for your help in improving XXXXX High School.

Gardner, P., & Tamir, P. (1989); Glynn, S., & Koballa, T. (2006); Hoffman, B., Badgett, B., & Parker, R. (2008); Hoy, W. (2010); Hughes (2006); Pintrich, P., et. al. (1991); Trumper, R. (2006).

APPENDIX C

TEACHER/ADMINISTRATOR INTERVIEW QUESTIONS

As part of this interview, I must include a brief consent statement before we continue. The contents of this project will be analyzed as part of my dissertation for completion of my Ed.D. at Georgia Southern University. All information on your identity will be kept confidential unless otherwise required by law. If data collected from this interview are published, pseudonyms will be used for any quotations or other information that could potentially be identifiable. This project is for research and educational purpose only. The research is not expected to cause any discomfort or stress. However, some people may feel uncomfortable answering some questions. If you feel uncomfortable during the interviews, you may decline to answer and stop participating at any time without penalty. No risks are expected. This interview will last approximately 30 minutes to one hour and will be tape-recorded. Do you agree? Are you ready to begin?

The interview is designed to help establish the effectiveness of the single-sex classes at XXXX High School. There is no guarantee that single-sex classes will remain at XXXX High School, but open and honest assessment is needed to help make that decision.

1. What were your expectations before you started teaching single-sex classes? (before you observed single-sex classes?)
2. Are there any differences in your instructional methods you use when teaching single-sex classes? (have you observed any differences in instructional methods when you observed single-sex classes?)

3. How does your approach to teaching (administration) influence student achievement?
4. Are student behaviors in the classroom different with single-sex classes as compared to coeducational classes? If so, how?
5. What is the impact, if any, of the single-sex classes on how you asses your effectiveness as a teacher? (the effectiveness of your teachers in 9th grade?)
6. Does single-sex instruction change student achievement? If so, how? (i.e., what are your perceptions of student achievement as a result of the single-sex classes?)
7. Would you recommend single-sex instruction to other subjects, and locations? If so, where and how? If not, why?
8. What factors, if any, would confound, confuse, or cloud the effect of single-sex instruction?
9. Would you change any of the mechanics and structure of the single-sex classes if you taught the class again? (if it were offered again?)

Friend (2006).

APPENDIX D

STUDENT QUESTIONNAIRE LINKS TO LITERATURE

Original Question	Revised Question	Research Question	Link to Literature [1]	Scale measured
Please state any thoughts you had about biology. Was it fun? Did you enjoy it? Do you think that being in a single-sex class or coeducational class helped you achieve more?	Please state any thoughts you had about biology. Was it fun? Did you enjoy it? Do you think that being in a single-sex or coeducational class helped you learn more? All thoughts are welcome…	3		All (open ended qualitative analysis)
I feel safe in this class.	I felt safe in biology as compared to my other classes.	2,3	Hoffman, B., Badgett, B., & Parker, R	Emotional security
I felt more free to express questions in thoughts and biology as compared to my other classes	I felt freer to express questions and thoughts in biology as compared to my other classes	2,3	Hoffman, B Badgett, B. & Parker, R.;	Emotional security
I felt safer in trying new activities in biology as compared to my other courses.	I felt safer in trying new activities in biology as compared to my other courses.	2,3	Hoffman, B Badgett, B. & Parker, R.; Hughes, T [2]	Emotional security
School science has opened my eyes to new and exciting jobs	Biology has opened my eyes to new and exciting jobs.	2	Trumper, R.	Interest
I enjoy studying biology.	I enjoyed studying biology.	2,3	Glynn, S., & Koballa, T	Interest
I cannot see why some people devote their lives to the study of plants and animals.	I cannot see why some people devote their lives to the study of plants and animals.	2	Gardner, P., & Tamir, P.	Interest*
The biology I learn is relevant to my life.	The biology I learned was relevant to my life.	2,3	Gardner, P., & Tamir, P.	Interest
If given the opportunity, I would like to take a (another) single-sex class.	I would like to take another biology related class.	2,3	Hoffman, B., Badgett, B., & Parker, R	Interest
I am often frustrated not knowing what is going on.	Sometimes I participated less in biology as compared to my other classes because I did not know what was going on.	2,3	Gardner, P., & Tamir, P.	Participation*
I participate in many class discussions.	I participated in more class discussions in biology as compared to other classes	2,3	Hoffman, B., Badgett, B., & Parker, R	Participation

I work hard to do well in this class even if I don't like what we are doing.	I participated frequently in biology even if I did not like what we were doing.	2,3	Pintrich, P., et al.	Participation
I participated equally with my lab partners when we did dissections.	I participated equally with my lab partners when we did dissections.	2	Hughes, T; Spielhagen, F	Participation
When working in the class, I often try to explain the material to a classmate, or have them explain it to me.	When others needed help, I would explain to them what I knew about biology.	1,2,3	Pintrich, P., et al.	Peer help
I try to work with other students from this class to compete the course assignments.	Often I would study with others in biology.	2,3	Pintrich, P., et al.	Peer help
Students here just aren't motivated to learn.	I did not often help other students in biology because biology was not interesting.	2,3	Hoy, W	Peer help*
I worked on many biology projects or homework assignments with others in biology.	I worked on many biology projects or homework assignments with others in biology.	2,3	Pintrich, P., et al.; Hoy, W[2]	Peer help
I expect to do will in this class.	I believe I will do well in biology.	1,2	Pintrich, P., et al.	Self-efficacy
I am certain I can understand the basic concepts taught in this course.	I am certain that I understood the basic concepts taught in biology.	1,2	Pintrich, P., et al.	Self-efficacy
Considering the difficulty of this course, the teacher, and my skills, I think I will do well in this class.	Considering the difficulty of this course, the teacher, and my skills, I think I did well in this class.	1,2	Pintrich, P., et al.	Self-efficacy
I put enough effort into learning biology.	I believe the effort I put into learning biology was sufficient.	2,3	Glynn, S., & Koballa, T	Self-efficacy

[1] Questions originated from instruments created by these researchers.
[2] Information for the development of this item came from research from these authors.
* Items are reversed scored.

APPENDIX E

TEACHER/ADMINISTRATOR INTERVIEW QUESTIONS LINKS TO LITERATURE

Question	Literature	Research Question
What were your expectations before you started teaching single-sex classes?	Cable & Spradlin, 2008; Jerome et al, 2006; Hughes, 2006; Dee 2006	2,3
Are there any differences in your instructional methods you use when teaching single-sex classes?	Spielhagen, 2006; Mead, 2008; Rogers, 2008; Logan, 2007; Hoffman and Badgett, 2008	2,3
How does your approach to teaching influence student achievement?	Herr & Arms, 2004; Cooper, 2006; Rex & Chadwell, 2009; Ryan, 2009	1,2,3
Are behaviors in the classroom different with single-sex classes as compared to coeducational classes? If so, how?	Ferrara & Ferrara, 2008; Mael et al, 2005; Rogers, 2008; Jerome et al, 2006; Hoffman and Badgett, 2008; Rex & Chadwell, 2009; Salminen-Karlsson, 2007; Hughes, 2006; Jorgensen and Pfeiler, 2008; Davis, 2006; Weil, 2008	2,3
What is the impact, if any, of the single-sex classes on how you asses your effectiveness as a teacher?	Mael et al, 2005; Rex & Chadwell, 2009; Spielhagen, 2006	1,2,3
Does single-sex instruction change student achievement? If so, how? (i.e., what are your perceptions of student achievement as a result of the single-sex classes?)	Spielhagen, 2006; Theirs, 2006; Herr & Arms, 2004; Cooper, 2006; Mael et al, 2005; Rex & Chadwell, 2009; Hoffman and Badgett, 2008; Dee 2006; Jerome et al, 2006; Logan, 2007	1,2,3
Would you recommend single-sex instruction to other subjects, and locations? If so, where and how?	Cooper, 2006; Rogers, 2008; Hoffman and Badgett, 2008; Jorgensen and Pfeiler, 2008; Weil, 2008; Tsolidis and Dobson, 2007	2,3
What factors, if any, would confound, confuse, or cloud the effect of single-sex instruction?	Ferrara & Ferrara, 2008; Mael et al, 2005; Dee, 2006	1, 2,3

Would you change any of the mechanics and structure of the single-sex classes if you taught the class again?	Ferrara & Ferrara, 2008; Herr & Arms, 2004; Gurian, et al, 2009; Ferrara, 2008; Ryan, 2009; Rogers, 2008; Logan, 2007; Jerome et al, 2006	2,3

APPENDIX F

PARENT INFORMED CONSENT

1. My name is Bobby Costlow, an Ed. D. candidate in the College of Education. I am performing a study on the effects of single-sex education on student achievement in the hopes of finding a viable tool to improve student achievement. Single-sex instruction is where the classes are either all boys or all girls.

2. The purpose of this study is to analyze the effectiveness of single-sex instruction. In the study, student achievement and engagement will be explored using student questionnaires.

3. Participation in this research will include completion of an anonymous student questionnaire at the completion of the course. The survey is completely confidential in that no names will be given on the survey. There will be no way to link any responses to any student. Also, the survey will be completed on the last day of class at the conclusion of the final.

4. The risk in the questionnaire is extremely minimal. In fact, there is nothing involved in the questionnaire that would be of any more risk than is associated with the student's normal daily school activities. In addition, the students will have the right not to respond to any question(s) that they choose.

5. Benefits to the student include being able to have a part in a beneficial student achievement study as well as being able to voice any benefits, or lack thereof, of single-sex instruction. The study will add to the limited body of research on single-sex instruction and could affect instructional decisions made within many schools, including this one, offering or contemplating single-sex instruction. Through the questionnaire, the students will be able to have a voice in curriculum decisions at their own school

6. The questionnaire will take approximately ten minutes. No other time will be required for your son or daughter.

7. The data received from the students will be kept in complete confidentiality. The data will be locked in my personal office for five years with access only by me and will be destroyed no later than the end of the year 2016. Under no circumstances will the data be allowed to be viewed by anyone other than me without your permission.

8. Participants have the right to ask questions and have those questions answered. If you or your son or daughter has questions about this study, please contact me at (XXX) XXX – XXXX or via email at bcostlow@XXXXX.XXX. For questions concerning your parental rights as a research participant, contact Georgia Southern University's Office of Research Services and Sponsored Programs at 912-478-0843. The study will also be available online at the Georgia Southern library at the conclusion of the study.

9. At any time during this questionnaire, your son or daughter may refuse to participate, may end their participation at any time and do not have to answer any questions they do not want to answer. There is no penalty of any nature for their deciding not to participate in the questionnaire.

You will be given a copy of this consent form to keep for your records.

Title of Project: A case study of single-sex biology classes in a high school in South Georgia

Principal Investigator: Bobby Costlow
XXXXX
XXXXX
XXXXX
XXXXX@XXXXX

Faculty Advisor: Dr. Paul Brinson
Georgia Southern University
Statesboro, GA 30459
(912) 478-5324
pmbrinson@georgiasouthern.edu

_____ _____
Parent Signature Date

I, the undersigned, verify that the above informed consent procedure has been followed.

_____ _____
Investigator Signature Date

APPENDIX G

TEACHER/ADMINISTRATOR INTERVIEW INFORMED CONSENT

1 My name is Robert H. Costlow, an Ed. D. candidate in the College of Education. I am performing a study on the effects of single-sex education on student achievement in the hopes of finding a viable tool to improve student achievement in the school in which I work.

2 The purpose of this concurrent mixes-methods study is to analyze the effectiveness of single-sex instruction. In the study, standardized test scores will be used to measure the relationship between the positive and negative growth of the students in the single-sex classes as compared to coeducation classes. At the same time, student achievement and engagement will be explored using student questionnaires and teacher interviews.

3 Participation in this research will include completion of an approximately thirty-minute long interview. The interview will be audio taped and transcribed to search for overarching themes within the interview. After the interview is transcribed, you will have an opportunity to analyze the transcript for accuracy before being included in the study.

4 The risk in the interview is minimal. In fact, there is nothing involved in the interview that would be of any more risk than is associated with your normal daily work activities. Embarrassment or uncertainty of answers will be a possible risk, but all confidentiality procedures, including pseudonyms will be used to assure you of minimal risk. In addition, you have the right not to respond to any question(s) that makes you uncomfortable.

5 Benefits to you include being able to have a part in a beneficial student achievement study as well as being able to voice any benefits, or lack thereof, of single-sex instruction. The study will add to the limited body of research on single-sex instruction and could affect instructional decisions made within many schools offering or contemplating single-sex instruction.

6 The interview will take approximately thirty minutes and the review of the transcript approximately ten minutes. No other time will be required for you.

7 The data received from you will be kept in confidentiality (the audio and written transcription). The data will be locked in the researcher's personal office for five years with access only by the researcher and will be destroyed no later than the end of the year 2016. Under no circumstances will the data be allowed to be viewed or heard by anyone other than the researcher and you without your permission.

8 Participants have the right to ask questions and have those questions answered. If you have questions about this study, please contact the researcher named above or the researcher's faculty advisor, whose contact information is located at the end of the informed consent. For questions concerning your rights as a research participant, contact Georgia Southern University Office of Research Services and Sponsored Programs at 912-478-0843.

9 At any time during this interview, you may refuse to participate, may end your participation at any time by telling the researcher, do not have to answer any questions you do not want to answer, or refuse to allow any of the data obtained from the interview be used in the study. There is no penalty of any nature for deciding not to participate in the study, and you may withdraw at any time without penalty or retribution.

10 You must be 18 years of age or older to consent to participate in this interview. If you consent to participate in this interview and to the terms above, please sign your name and indicate the date below.

You will be given a copy of this consent form to keep for your records.

Title of Project: A case study of single-sex biology classes in a high school in South Georgia

Principal Investigator: Robert H. Costlow
XXXXX
XXXXX
XXXXX
XXXX@XXXXX

Faculty Advisor: Dr. Paul Brinson
Georgia Southern University
Statesboro, GA 30459
(912) 478-5324
pmbrinson@georgiasouthern.edu

_____ _____
Participant Signature Date

I, the undersigned, verify that the above informed consent procedure has been followed.

_____ _____
Investigator Signature Date

APPENDIX H

PERMISSION TO PERFORM STUDY IN DISTRICT

XXXXXX High School

Bobby Costlow, AP
XXXXX, AP
XXXXX, Sp. Ed. Coordinator

Logo deleted

XXXXX, AP
XXXX, AD / AP
XXXXXXXX,
Instructional Coordinator

XXXXXXXX, Ed.D.
Principal

To: Institutional Review Board
Georgia Southern University

From: Dr. XXXXXX
Superintendent, XXXXXXX Schools

Re: Dissertation by Robert H. Costlow

To Whom It May Concern:

I give my permission for Robert H. Costlow to perform his study concerning Single-Sex classes at a high school in XXXXXX.

Sincerely,

Dr. XXXXXX
Superintendent, XXXXXXXX Schools

APPENDIX I

MALE TEACHER INTERVIEW TRANSCRIPT

As part of this interview, I must include a brief consent statement before we continue. The contents of this project will be analyzed as part of my dissertation for completion of my EDLD at Georgia Southern University. All information on your identity will be kept confidential unless otherwise required by law. If data collected from this interview are published, pseudonyms will be used for any quotations or other information that could potentially be identifiable. This project is for research and educational purpose only. The research is not expected to cause any discomfort or stress. However, some people may feel uncomfortable answering some questions. If you feel uncomfortable during the interviews, you may decline to answer and stop participating at any time without penalty. No risks are expected. This interview will last approximately 30 minutes to one hour and will be tape-recorded.

RC; Do you agree?

MT: Yes

RC; Are you ready to begin?

MT: Sure

RC: The interview is designed to help establish the effectiveness of the single-sex classes at XXXX High School. There is no guarantee that single-sex classes will remain at XXXX High School, but open and honest assessment is needed to help make that decision.

RC: What were your expectations before you started teaching single-sex classes?

MT: I really think my initial expectation was to have no expectation.

RC: That sounds kind of unusual.

MT: I didn't want to form any bias towards a class. I was trying, probably, keep it as even-keeled as possible because, you know, if I wanted my guys to succeed I could work harder or do some things towards that class. I really tried to not have any expectations and let the data speak for itself as far as that went. However, in the back of my mind, I thought it was great. Teaching a bunch of guys, going along with being a guy and coaching guys, it really made my day a lot more pleasant.

RC: How so? What do you mean?

I don't know. I think as a male you relate to males better. As a female you relate to females better. I can understand some of the things they are going through. I've dealt with those emotions. I've been through puberty. You know I've done all that kind of stuff. So there is little more of a connection, little more of a relationship building aspect that you have with guys and a little more freedom there than you do with teaching female students.

RC: Makes sense. Are there any differences in your instructional methods you use when teaching single-sex classes?

MT: With the guys, there are some things you can do with the guys. Things that they don't react to as much. When you have a set of guys getting loud, you know, being a little more in your face and that type of thing, their more accepted as discipline that girls, who tend to act out in those situations. With my guys there was a lot more…how to I put it… a lot more team building things we could do…games and group activities and competitions and things like that that the guys tend to draw more from. You know, we're naturally competitive. When you get a bunch of guys, pin them up, and tell them we are

going to have this competition, they are more inclined to focus in on the task at hand, to be successful, just in my observations. So there are a lot of things like that that are more successful with guys. I found that when I did stations and stuff that was a little more successful with guys, you know, each station was a little something different, that they could make that transition to the next station a lot easier, with less hang-ups.

RC: So you dissections and things like that were easier with your male class than your coed class?

MT: Oh, yeah. Without a doubt…socially.

RC: Gotcha. How does your approach to teaching (administration) influence student achievement? This is just a general question.

MT: I think relationships play a huge role in my teaching. I think the kids…they need the discipline and they need the structure…but ultimately, in order for them to do what it is I need them to do they've got to feel like it matters. And if I can build that relationship with that kid, then many of the things I say have more merit. If I tell them something is important then it in turn becomes important because of the relationship I built. And like I said with the guys' class, I think it is a lot easier to build those relationships…and that may be me, more, but it is easier to build the relationships with the male students than the female students.

RC: Yes, it may be you or it might be the kids. But if it is something you can do to help build the relationships then who cares the reason as long as it gets done.

MT: And they work harder. You've seen it being a coach, on the field, when you build those relationships with those guys, they'll do anything so that you're happy. Well, not so much that your happy, but that they done well and met your approval.

RC: They don't want to let you down…run through a brick wall for you. OK. Are student behaviors in the classroom different with single-sex classes as compared to coeducational classes? If so, how?

MT: The discipline problems I had with the guys class was usually the same student. It wasn't multiple students. It was something he did in every class. It was usually an attitude thing…like refusal to do work. In mixed classes you see a lot more disrespect…a lot more….

RC: Why do you think that is?

MT: Why do I think that is? Well, on the guys' side, with the girls in the room, they don't want to be looked at like…

RC: So it's more of trying to be the tough guy and impress someone?

MT: Right, right. And with the girls….I don't have any idea with the girls. But they're just so social, and you've got the ones in there that are your frequent offenders and that kind of stuff. But the biggest discipline issue with any of my classroom, and this is the classroom management standpoint, is just the socializing…just trying to get them focused on a task and stay focused on that task for an extended period of time without them bringing in their drama and all the other things that they want to talk about.

RC: I know I am at that stage at home with my daughter. I tell her that I need you for five minutes. Once I am done, you can go on with what you were doing, but I need you for these five minutes. OK. What is the impact, if any, of the single-sex classes on how you asses your effectiveness as a teacher?

MT: pause….assess my impact.

RC: There may not be any…just what you think

MT: It's easy teaching the guys. There is a lot less stress going in and teaching my guys as opposed to my mixed classes. And I think the one thing I can take from it, especially grow professionally, is that there is no guarantee that I will always be teaching single-sex classes…and there has to be some relevancy to building relationships with those female students and be able to get them to succeed and work as hard as the guys do. They have the potential to do it…it's just getting them there.

RC: Why do you think it is that they don't work as hard when they are in there with coed classes?

MT: Um, I don't know. I stopped trying to figure out females a long time ago.

RC: Does single-sex instruction change student achievement? If so, how?
And I am not just talking about test scores. Student achievement includes a side variety of things.

MT: Change student achievement…I have seen…I've got several examples of guys who single-sex classes are designed for them. Now, are all twenty-nine guys who are in my single-sex classes, is it designed for them? No. Is it effective for them? Yes. Would they maybe have been successful in a coed class? It's hard to tell. But there are a handful of kids, some of the kids, who are in that class that it is designed for them. It takes them away from major distractions, which are the girls. It allows them to…it is almost like an escape, really, from that social bubble, that would be the best way to look at it. They don't have to impress anybody…they don't have to show out…they don't feel like their every move is being watched by a girl they are trying to impress or be cool. They see a bunch of guys working hard to be successful at something just like them and in that whole process of working hard to be successful they actually learn something.

RC: You said that this is designed for a particular kid. Do you have a particular kid or characteristic that this is designed for?

MT: I think for some of our severe ADHD kids, one less distraction makes a world of difference. I think for some of our kids who are frequent offenders, as far as discipline goes, as far as for the guys, and this is having a male teacher, can give them that next step, and really get them to buckle down. You really have to realize that a lot of our kids, especially our male kids, are being raised by momma and grandmamma…you know what I am saying?

RC: Right…low socioeconomic…

MT: So having that solid male that, one, cares about them and two, they can depend on where that relationship comes in, really kind of feeds to them on a level that…I don't say female teachers can't do it, it's just different. It's hard to explain and study, but it is different.

RC: Well, that makes sense. We have an effect, and the females have an effect on girls that we never could have.

MT: Right

RC: Would you recommend single-sex instruction to other subjects, and locations? If so, where and how? If not, why?

MT: I would suggest single-sex classes, just for those kids we just talked about. If you have a class of thirty kids and the class is designed for six, the others are still going to learn. But it is about saving those six. You know what I am saying? Your not just…these twenty –four are probably going to pass no matter what the setting, but these six are going to fail…but now let's put them all together and now 30 pass instead of just

the twenty-four. I think in major classes it would work…your sciences, your math's…those kinds of things.

RC: Would you think social studies and English would benefit from it, too, or not?

MT: long pause….I don't know…I would that that social studies…but I don't have a lot of background in social studies…but I would think you would want both sexes in there because you are talking about legislation and angles. It really gets one-sided when you get a whole bunch of guys together.

RC: Yes, that makes sense. Alright, just a couple more. What factors, if any, would confound, confuse, or cloud the effect of single-sex instruction? In other words, when we look at the data, is there anything that would cloud that this is a result of single-sex classes.

MT: Um, I don't know. You know, I did the same lessons in every class. I tired to keep everything the same. But there is always going to be a little something…maybe I was a little more energetic in this class because they didn't cause as many issues that the other class. That would be the only thing that I would look at. But I tried to stay as consistent as possible.

RC: OK, last question. Would you change any of the mechanics and structure of the single-sex classes if you taught the class again? Maybe no, maybe yes.

MT: Well, the first time around I was a little freer with the guys. More of kind of letting them explore their domain, not locking them down, that kind of stuff. You know, if they got up and walked around…read some stuff, some research that said that is what guys do, they are wanderers, but they were still paying attention, those kinds of things. This time around, I did have a little more control on them; I did try to rein them down a

little bit, a little bit more structure. If we did it again, I would try, especially with the guys, doing a lot more peer teaching and peering assessment. I would probably give the guys a little more ownership. Does that make sense?

RC: Yeah, it does.

MT: Kind of make them the center of attention for the day, you know. Let them be the teacher, tell them to research and do this. I think with my guys' class that this would really be something. That they would say that hey, this is my day, something to really latch on to.

RC: That makes sense. Is there anything else you would like to say, any other comments, any questions for me, anything you need to know, or anything else you would like to say about it?

MT: Um, not really. I appreciate the opportunity to do it. It was fun.

RC: I appreciate you doing it. It was a big help. Thanks very much.

APPENDIX J

FEMALE TEACHER INTERVIEW TRANSCRIPT

As part of this interview, I must include a brief consent statement before we continue. The contents of this project will be analyzed as part of my dissertation for completion of my Ed.D. at Georgia Southern University. All information on your identity will be kept confidential unless otherwise required by law. If data collected from this interview are published, pseudonyms will be used for any quotations or other information that could potentially be identifiable. This project is for research and educational purpose only. The research is not expected to cause any discomfort or stress. However, some people may feel uncomfortable answering some questions. If you feel uncomfortable during the interviews, you may decline to answer and stop participating at any time without penalty. No risks are expected. This interview will last approximately 30 minutes to one hour and will be tape-recorded.

RC; Do you agree?

FT: Yes

RC; Are you ready to begin?

FT: Yes

RC: The interview is designed to help establish the effectiveness of the single-sex classes at XXXX High School. There is no guarantee that single-sex classes will remain at XXXX High School, but open and honest assessment is needed to help make that decision.

RC: What were your expectations before you started teaching single-sex classes?

FT: I expected them to do better as far as grades. But the other think that I really wanted to see was to see if I had a better rapport with them and be able to talk about things that I couldn't have done in a coed class.

RC: Did you find that out?

FT: I think the rapport was better, being able to apply those things that apply to females, it was.

RC: Are there any differences in your instructional methods you use when teaching single-sex classes?

FT: Yes, a little bit.

RC: How so?

FT: Trying to think of something specific. Girls tend to get into more silly things, or artistic things. When you give them a project to do, there's coloring and artistry involved. They tend to do better on those types of things than boys do. Singing, you know, and silly things like that, girls tend to do more when it is not in a mixed classroom. I guess those are the two main things that I noticed a difference.

RC: OK. How does your approach to teaching influence student achievement?

FT: pause

RC: It could be anything…and if you can't think of anything, you don't have to answer.

FT: Let me think about that.

RC: OK. I'll come back to that later. Are student behaviors in the classroom different with single-sex classes as compared to coeducational classes? If so, how?

FT: I don't know if you'll eventually get to this or not, but in my first experience last year when I did the all girl classes, I loved it. It was wonderful, and had very little discipline issues. This semester I've had more problems?

RC: With the single-sex?

FT: With the single-sex, and I don't know if it's like with other classes, that I am just not getting the right mix of students, You know how sometimes you get a mix of students and they just don't work well together. I don't know if it's that. So this semester there was a difference. Can you repeat the question?

RC: Sure. Are student behaviors in the classroom different with single-sex classes as compared to coeducational classes? If so, how?

FT: For me personally, I still had discipline issues in the all-girl classes, but for some reason I can handle them better, maybe because it was girls. What I tended to have trouble with boys was not wanting to sit down, not wanting to be still, wandering around the room, not doing work, and those issues I don't see in the girls' classroom. With the exception of one or two, the majority of them will work. The majority of them will stay in their seats unless they have permission to get up. The main issue I have with any of the girls is just back-talking. But as far as the discipline issues I have with a mixed class, I don't' have as much horseplay, things like that. So the discipline issue is better, for me, overall. But I don't know that if these girls that talked back would have done it whether it was a mixed class or not, or that they felt safer to do it. I mean, I really don't know. I don't have anything to compare it to.

RC: Maybe they felt a little braver and a little safer in here so they feel a little safer in doing something like that, too/

FT: Possibly, because it seems like to me in my mixed classroom, the girls don't talk back as much. But because it was all girls, they may feel…I don't know. There was one class in-particular this semester, a lot of talking back and rolling eyes…stuff that I've never really had before.

RC: OK. What is the impact, if any, of the single-sex classes on how you asses your effectiveness as a teacher?

FT: I don't about my effectiveness…um…

RC: I know there is a whole bunch of things.

FT: Right. I think I give them a safe person, or a safe female, to ask questions. I hope by conversations that we have and things that we do that I try to empower them as females. I would probably say that the impact I have on them is more personal than academic. Although I did try to do make sure all the quotes I used in class were from females. We talk about the quotes…what the woman had to go through…if she was a suffragette. Whatever the quote I used, I would like to think that this had some impact on their personal lives.

RC: I am sure it did. When you start to hear that more often, and you have a person that is trying to do that in class with you, that helps. Ok. Number six.

Does single-sex instruction change student achievement? If so, how? (i.e., what are your perceptions of student achievement as a result of the single-sex classes?)

FT: I haven't… (Pause)

RC: This doesn't necessarily mean test scores. This could be classroom discussion, or could be attendance. It could be test scores, but not necessarily. It is whatever you think. To me, student achievement is much more than just testing.

FT: OK. As far as academically, I haven't seen a difference as far as their grades seeming to be that much better. I do think we get into more discussions. I think they will discuss more when there are no boys in here.

RC: Do you think they go in depth more, or just longer discussions?

FT: It depends on the mix of the class. Last semester we went into in-depth discussions. In second block, we could get into in-depth discussions. In fourth block, because of attitudes, I would say….we would get into discussions, then it would get so loud, then they would start arguing and I would have to end it. So, I think the discussions are longer and they are more in depth. But because girls are girls and when they are around girls they are so vocal it's hard to manage discussions because they are all trying to talk at one time.

RC: I know it is a management thing, but in my opinion they are freer, they fell at ease, they want to get their part in, so boom-boom-boom, whereas if guys were there they wouldn't.

FT: Well, they do. Girls obviously talk a lot anyway. That's the whole study with the estrogen and testosterone and how it affects the brain. They show that woman are more verbal naturally. Their verbal in any class, but I think when it is all girls they are very, very verbal.

RC: I gotcha. That makes sense.

FT: Whereas just making a comment or two, they go into a whole lot longer…and they share their personal experiences as well. For example, if we are talking about cancer…it seems to me, and this is all my perspective, they share their perspectives a whole lot more.

RC: Is this girls in general or girls in single-sex classes?

FT: I am saying girls in single-sex, because girls in a mixed class don't seem to share personal information. But when we were talking about mitosis or we were talking about cancer…my mother has cancer, or my grandmother has cancer. They seem to be more personal when they're in a single-sex class. To me it makes it more relevant. Now, whether they see a question about cancer that they can apply that to that question, probably not. But I mean I thin they leave the class understanding a little more, like cancer…or why…you know, when you make it more personal.

RC: I understand. That very much makes sense. When you relate a new topic to something they have experienced personally, you build that relationship, you make it personal.

FT: Right…but unfortunately that might not be an answer on a standardized test. I teach the standards, but these discussions where we can really apply it to a real life situation are a lot of the time not the sort of questions that are on the test.

RC: The discussion might make it more relevant so they will remember the content more.

FT: Possibly. I mean is easier when we are talking about mitosis and we're talking about cancer to make it more relevant to personal experiences to make it more relevant than if you're talking about ecological succession. I do try to use something that they would be more….like I don't talk about motors, generally, with all girls. I try to take an example that they would be more likely to …

RC: Use in class.

FT: Now, one thing…now, I had one girl who was openly homosexual, and then another girl who said she was bisexual in that class, and that tended to cause some…not disciplinary issues…I mean it's actually more of a distraction to that girl that is openly homosexual than I think she would have been in an all boys class. And, I know those questions are personal and you can't really ask those types of questions before they come to class… but I think in certain circumstances, especially when you have a girl who is openly homosexual or is leaning towards that, it is actually more distracting…she was the one who was up walking around, talking…

RC: She exhibited some male characteristics.

FT: She was actually more like what the guys would be. The ones I had trouble keeping in their seat, wanting to flirt, that sort of thing. Actually, she was the one constantly walking to the door wanting to look out of it, you know, which is kind of comical.

RC: Alright. Would you recommend single-sex instruction to other subjects, and locations? If so, where and how? If not, why?

FT: (Pause) I think there's a lot involved in that question because I don't think it necessarily goes by subject. I think you have to look at the people who are teaching them. Because I have heard some women say that I couldn't take a whole classroom full of girls, or, you know….or course (MT) wants all the boys. He likes having all the boys. And if I had to choose…my personality type, I had four sisters. I would still like to do all girls classes, but I think you really have to look at the teacher. I think that would be the number one thing. And then after that, after you look at the teacher, I would say classes

where's there's discussion and they'll discuss more. I think there is where the classes are the best. I know if math they say it helps.

RC: Most of the studies I have read really deal with middle school. Very few, if any, deal with high school. Usually the ones you see in high school are with an all-girls or all-boys high school, not a single-sex class within a high school, so it's hard to compare. However, a lot of the middle school studies show the number of girls that actually major or study a science in high school…triple.

FT: I can see that.

RC: It is huge increases. But if all you have is a ninth grade single-sex class, there isn't really anything you can compare it to. Math in middle school do show some tendencies that girls do participate more in class, and they become more involved with math in high school. Not enough studies, though, to show a direct cause and effect relationship. Just enough to make you think about it.

FT: Well, what worries me is that the girls, um, because part of being in high school is being so social and, you know, getting attention. I think when they go and do these surveys…and I don't know what these surveys have said…but when they go and do the surveys, are they really looking at are this better for my education. Or is it I didn't like the class? You know…they wanted the classes with the males in it. I don't know…it…it…

RC: And that is something…when I read a lot of the literature, and the comments that match the literature. And the literature says two things. Some don't like it because there are no boys there, and boys don't like it because there are no girls there. But there are others that say, yes, I really liked it. The comments are following along those trends.

FT: Yeah.

RC: Alright. What factors, if any, would confound, confuse, or cloud the effect of single-sex instruction? In other words, it I'm analyzing this for my dissertation, and (the principal) is on my committee, so he is going to know, is there anything I can say this occurred in single-sex, but it would be hard to say single-sex is a correlating affect of this.

FT: A far as academics? As far as grades I don't think that you could say that single-sex has any….and I'm talking about with our situation…

RC: Right.

FT: Long term I am sure it would, because the girls who are coming in and I think I've heard (MT) say this, too, the girls and the boys who are coming in and are doing poorly probably would have done poorly anyway. I don't them being in a single-sex or a mixed class has a bearing on that because I think no matter how hard we try, part of education is…you know…it doesn't matter if you're in a mixed class or single-sex class that would stop you from turning in your homework or doing your homework to begin with. To some extent, maybe, building the relationship and wanting to please the teacher could possibly have some effect on doing their homework or not, but I think a lot of the issues that are not under our control…does that make sense? Am I making sense?

RC: Yes, that makes sense. I understand what you are saying.

FT: So other than that, I still think I had less discipline issues, even though I did send some girls to ISS. I think if you look at my overall past four years that I have been here I have tended to a lot more guys to ISS than girls. Usually I can take a girl outside the room and talk to her and they'll straighten up. What I am saying is that I just don't think

you can look at discipline; I wouldn't just look at that one class. As far as the teacher, I would look at it…not sure how you would compare it…it seems to me, I have sent a whole loot more boys to ISS or written more up…I am sure I have a few. I don't know if that's me, or it's the all-girl class or if it's a combination of both. In fact I had a girl recently apologize to me for something she has done. I think even when we have words they seem to apologize to me more.

RC: That's good, and it kind of makes sense. That kind of goes along with the literature, too.

FT: The thing, though, whereas…I don't know…girls just seem to me…react…differently to me…or maybe I'm reacting differently to them and they can sense it. I don't know, but there's something there and I can't really place it. But there's something there that I don't have with boys. I mean, I can get along with boys, but there is something there that I have with female students that I don't have with male students. Maybe it is that they have someone that they can look up to, or feel safe with. I don't know.

RC: I understand. OK. Last one here and then we'll go back to that other one. Would you change any of the mechanics and structure of the single-sex classes if you taught the class again? Maybe yes, maybe no.

FT: Um….I would like to….I don't think I was as effective as I could be. I definitely think that there was room for improvement. I would probably stay on the same lines like I did…doing the all female quotes…every once in a while I would quote poetry. I would definitely try to stay along those lines in order to keep relevancy. I think eventually over time…it would take a while…but just start building activities and things, over time, that

are more tailored to girls instead of just a general…like if we do an activity about DNA testing and start trying to make it more relevant to girls. I think it's probably the only thing I would change. And that just takes time to find those activities or make those activities.

RC: Yeah, that makes sense.

FT: I mean, over time, to where…

RC: It does. Just like with any teacher whether you are coed or single-sex. You're thinking along two different lines. What I am doing for this class and that class is just a little bit different. It takes a little more time.

FT: Yes, and I started getting honors this semester, too, so it started putting…you know…even more so what works for this class that doesn't work for that class and it's hard to keep up with.

RC: I imagine so.

FT: But, um, I do think in general…

RC: That you would stay along the same lines?

FT: Yeah. The relevance thing…trying to make it as relevant as possible helped.

RC: OK. This is number three that we skipped before. If you don't have an answer, then don't worry about it. How does your approach to teaching influence student achievement?

FT: (Pause) I honestly can't…

RC: OK.

FT: I mean I can give you the pat answer…not a pat answer, but an answer I would give for my general students.

RC: That's fine.

FT: But I can't pinpoint one specific thing towards girls. I hope that….what I would always like to accomplish is that I spark some interest. I am always trying to think of ways to spark their interest in science. I think we definitely need more scientists and people thinking outside the box and majoring in science. So I would like to think that I would inspire them…not sure if that is a good choice of words…but to think of science as a career…I think that would be my number one thing. And to also encourage those that, you know, wouldn't have done well in school and to keep at it. Those are probably the two things that I would more than saying they know this information or they don't. But maybe did I get them thinking. Did I say, Oh, get them to say, Oh, maybe I do like science, or maybe that's cool.

RC: That makes sense.

FT: And that would be the same for boys or girls.

RC: That makes perfect sense. Is there anything else you would like to tell me….like to talk about…anything at all about coed, single-sex, or teaching in general?

FT: I think….overall, I think that the same sex classrooms…I like the same sex class rooms. I think with anything else, with any other type of class, it makes a difference with the mixture of girls you get. And there is no way when the girls are coming in if one will be homosexual or not, or if she is going to be a gossiper or not, or if she is going to be…I mean….I don't know if there is any way to fix that problem. But I think if…that girls' class last semester, I loved it. I just think it was a wonderful mix of girls, they all got along…I didn't have much attitude. It was just a wonderful mix of girls. And if I had every girl's class like that, I would teach all girls all day long. And some of the issues

can't really be helped because it all depends on scheduling. But I would mix the races; try to get the races even. I would try to…you know…you don't want it to swing towards one socioeconomic status or another, or one race or another. I think that is why I saw a difference. The races were more mixed in second block…and I think it tends to make a difference. Not necessarily with their grades, just how they interact with each other.

RC: OK

FT: I mean, does that make sense?

RC: Yeah, makes sense.

FT: Alright

RC: OK. That'll do it. Thank you very much.

APPENDIX K

ADMINISTRATOR INTERVIEW TRANSCRIPT

As part of this interview, I must include a brief consent statement before we continue. The contents of this project will be analyzed as part of my dissertation for completion of my Ed.D. at Georgia Southern University. All information on your identity will be kept confidential unless otherwise required by law. If data collected from this interview are published, pseudonyms will be used for any quotations or other information that could potentially be identifiable. This project is for research and educational purpose only. The research is not expected to cause any discomfort or stress. However, some people may feel uncomfortable answering some questions. If you feel uncomfortable during the interviews, you may decline to answer and stop participating at any time without penalty. No risks are expected. This interview will last approximately 30 minutes to one hour and will be tape-recorded.

RC: Do you agree?

FA: Yes

RC: Are you ready to begin?

FA: Sure

RC: The interview is designed to help establish the effectiveness of the single-sex classes at XXXX High School. There is no guarantee that single-sex classes will remain at XXXX High School, but open and honest assessment is needed to help make that decision. The first one. What were your expectations before observed single-sex classes?

FA: Didn't have any

RC: None at all?

FA: Nope

RC: Have you observed any differences in instructional methods when you observed single-sex classes?

FA: Compared to what:

RC: To coeducational classes. In other words, did you notice when you went in one of their single-sex classes that they did things differently than when they were in their coeducational classes?

FA: No.

RC: So they were pretty much even keeled across the board?

FA: Yep.

RC: How does your approach to administration influence student achievement? This is more for you and what you think?

FA: For teachers or students?

RC: Either. Whatever you think. Whatever you want to say.

FA: I feel I need to be a motivator. Set expectations high for both teachers and students, and make sure teachers and students are always aware of any changes as far as grades, policies, procedures…all of them kept in the loop.

RC: Are student behaviors in the classroom different with single-sex classes as compared to coeducational classes? If so, how?

FA: Yes. I think there's more open communication as far as the same sex. I don't know that it's always... (Pause)…

RC: Your not sure…you say what ever you want to…it's free reign.

FA: I'm not sure the conversations are always necessary. I think they can get off track.

RC: So you are talking about as in a male class where the teacher is talking about the human body and they get off track, or are you talking about any conversation, they get off on tangents a little bit more? Or that the conversation just leads a different way.

FA: I think it leads a different way.

RC: What is the impact, if any, of the single-sex classes on how you asses the effectiveness of your teachers in 9th grade?

FA: No impact

RC: What are your perceptions of student achievement as a result of the single-sex classes?

FA: I expect them to achieve no matter what classroom they are in. It doesn't change because it's single-sex.

RC: So, what you are thinking is that no matter what, they should achieve either way?

FA: They should.

RC: OK. Would you recommend single-sex instruction to other subjects, and locations? If so, where and how? If not, why?

FA: No, I would not, because it's not real world. We've got to learn to get along with everybody and work and be able to learn in all different environments with different learners, not just the same sex.

RC: OK. What factors, if any, would confound, confuse, or cloud the effect of single-sex instruction? In other words if we are trying to determine if single-sex worked or not, what would be some things that you would say that single-sex did or did not cause this.

FA: I don't…..I don't think you could evaluate the teacher whether it was based on single-sex or not… (pause)…or student achievement.

RC: OK.

FA: I don't think you can base that on just what type of classroom it is.

RC: Is there anything that would kind of go along with that? Is there anything that, if you found something, you could say yes, single-sex caused this, either positive or negative? There may not be…I don't know.

FA: No. I don't think so.

RC: OK. The last question…would you change any of the mechanics and structure of the single-sex classes if it were offered again?

FA: Not that I can think of.

RC: OK…thank you very much for your help.

APPENDIX L

STUDENT OPEN-ENDED RESPONSES

Each response is exactly as was written by each student.

Responses by students on coeducational classes

i loved mrs XXXXX class. she is an amazing teacher.

I'm not looking for a job dealing with biology

maybe a few (opened my eyes to new jobs in biology)

i tried when i could

I did my best in all my classes

It was easy

mrs XXXXX made it very fun.

I didn't study at home, I never have. I did like the class; however.

I had days where I would work and other days where I wouldnt.

always paid attention

i do better by myself

I never studied

I express even if I'm not allowed to. I'm open minded

I'm very helpful

even though the class was fun, I cant see working like that

we didnt dissect anything in my class

no one disserves to do ALL the work

i am never going to do anything that involves biology

i absolutely hated biolgy even though i had a pretty cool teacher it was sooo boring

i would love to have mrs XXXXX again

single sex classes can be confusing and often can have a semi low chance of turning hostile in a all male class, males could fight with one another while in groups for opinions and thoughts differ.

Yeah it was fun....

I enjoyed biology, I liked the way the teacher tought and the people in the class.

It was normal its was just a normal class. but i learned alot from it.

biology was fun for me my 1st year of high school . i enjoy take notes in class on many types of things we learn .

it was fun i love biology i did enjoy in i like coeducational class better

i had more fun in this class than any other classes i took.

it was very hard and i would havefelt more confident about this subject if it would have been more visual.

I loved it!!

um biology was ok but i didnt realy like it it was really boring but i did have a pretty cool teacher

yes it was kinda fun. some things were enjoyable, others weren't. being in either single-sex or coeducational classes either way helped. maybe single classes are better. but i did well in coeducational. biology was interesting.

i dont want to be in a single-sex bilology class because, there's no poiint in it.and i dont really like biology and i usually failed in that class. but i guess thats th way life is for some people

it was very fun in mrs XXXXX class she keep it interesting with us. i also lioved the projects and labs and working with partners too.

it was a fun class that i enjoyed learning in

it was ok. i think co-ed would be better.

This class was complicated.I dont want this class again.

i think i did ok but if i would have did better then it was better if i had a better teacher because the teacher i had was crazy to me he didnt teach us ANYTHING

I hate biology class. The teacher was mean and rude & the work was hard. I make good grades in school but in this class i seem to have trouble in. i dont like this class at XXXXX high school.

that stuff doesnt teach us about the future! i dont want to be a scientist.. and i aint gone be one.. and it seems like we have been learning the same thing every since elementary!!!!

I really didn't know because it was complicated.

i kinda did and kinda din't (understood the concepts)

i didn't not learn anything from mr.ward

no i didnt i dont see why we take this class because we dont really use it in the real world.

its for people who wants to take a degree in this subject.

I hated it.

i dont like it that much because it is harder than wat they teach and then when you ask a question they wont help you

I REALLY DIDNT LIKE IT

its a boring class and i dont really understand what is being taught.

yes i do i try my best

some people may think it is cool but i don't(working in biology)

LOLXX I REALLY CANT ITS BORING !

I coudn't because many of my classmates didn't know either.

we didnt do lab work

i passed the class and the teacher was great

i feel that biology isnt going to be of any use to the real world. I can understand if you want to be a scientist or want to study plant life, but for you to not be doing anything that envolves science. its not relevant.

I HATE BIOLOGY!! (matched many others)

I hate biology ! i didnt put my mind t it and it was my fault so i dislike it !! it was fun sometimes ; depends what we was doing ! Hate being in a class with all girls ; wasnt my thing.

it was fun and i liked it a little but other than that i had a good time in his class.

I was ok,had a hard time with my grade,they were up and down.But now they are better(;

That he could of explained the subject in good way..he was a bad lazy teacher

I hate biology. I hate the teacher too. I dont want this class anymore. XXXXX is a good person but i hate biology because he made is difficult. It's not a AP class. He made it seem like it was. This biology class to me is NOT NEEDED AT XXXXXX HIGH SCHOOL ANYMORE.

i dnt have nothing to say about biology. i hate that subject and class i think its very boring and stupid! biology does not have anything to do with my career that i am taking up for when i got off to college. so bump biology and all of the teachers that teaches it, because it is quite dumb for us humans to learn!!!

i like a coefuctional class better

I REALLY DID NOT LIKE BIOLOGY CAUSE THE INFO WAS HARD TO UNDERSTAND AND MR.XXXX JUST FUSSED AND MADE THE WORK HARDER

it was okay and sometimes i did, i think being in a coeducational class was better for me cause if i had a class with only just girls i would do bad.

i just dont like it at all not my everyday thing i love math.

Biology was HARD. Entirely to hard and i felt that there was no point in learning it.

Some days were fun and some days i just didnt know what to do.

it was fun because my baseball coach was my teacher but i hated the work

it was sometimes fun.. i really didnt enjoy it. it isnt anything against the teacher, i just didnt enjoy learning about that kind of stuff.

No biology was not fun it was the worst class i ever had. The teacher did not teach us anything i really liked to learn good imformation i think a teacher should move on i think the teacher should not have move on to another chapter if th student didnt understand.

I thought this was the worst class i ever had. the teacher couldnt teach to me. i really would have liked to learn good information. i think a teacher shouldnt move on to a different chapter if evryone dont understand. the teacher need to start making the things they talk about clear... Thank you!

I HATE IT! NEVER WANNA TAKE IT AGAIN ! UHH NEVER !

Biology had its ups and downs other than that it was fun and I did enjoy it. I think that coeducational classes helped me learn more because it helps introduce you to the different students of different sexes.

biology was pretty boring. it wasn't fun. but i did my best. being either in a coeducation or single sex class doesn't matter to me because i would do just the same amount of work and effort.

it was ok but its not what in good in.

biology was a fun experience. I loved it

I think biology was really boring and difficult to understand. I think being in a coeducational class helped me some

Responses from students in single-sex classes

There were too many breakouts in that class and too many drama mamas.

it was the same as female mixed with males

no biology was the hardest subject ihave this semeter

I could understand it better , if i got more helped

Becuase I felt more open because I like that it was all girls.

With all girls it was easier to discuss things without the immaturity of males.

But we would also get off task easily. but what do you expect it was all girls.

i didnt express my answers in other classes so i dont care

i could have did better (considereing difficulty of class)

not really because i dont not like biology.

No can do didnt like it as much.

without same sex (take another class)

oh no i did not like it cause it was alot of boys

It was an expierience im glad i had. But don't know if i want to do it again.

it was alright. i wished it wasnt all girls. i think it should be a coeducational class. too many girls in one room. there all loud and not under control.

It was fun i really enjoyed Mrs. XXXXX

we do not need to have class like this buy sci. bc we ta

Yes it waas fun, and I did enjoy it I had made lots of friends and on top of all of it understood it better this why. It was fun and I think it should stay like this because the girls teamed up and got it done.

No it was not fun at all i did not enjoy this one bit.to tell you the truth it reallly dont matter to me if i don tbe in a single sex class or in a coeducatiucation class it really should"nt matter

It was okay but i did not like how it was a all girls class because we were easily distracted and we got off task easily.

i like the one sex cell class, not only does it help you focus but the girls can say things whn guys are not around! biology is very fun; expcially when you have a GREAT teacher! :)

Biology was okay, at times i did enjoy it. But i think i like ceducational class better. Being with the same sex room with 20 other girl was noisy and made it harder for me to learn.

It was not fun but i did learn some things. I sort of enjoyed it. I thought i learned more by being in a all girls class.

No it was not fun cause i did not ugnderstand what was going on.. In a class with a girl its hard to learn they stp to much

OK,I HAD ALOT OF FUN IN BIOLOGY.....BUT I DONT THINK ITS A GOOD IDEA BECAUSE AN ALL GIRLS CLASS IS SO NOT MY THING OK HAVE A GREAT DAY.....bye!!!!

It was okay. I think being in a single-sex class helped me a little bit.

Biology was fun, but there were to many attitudes in the all girls class. A lot of talking went on so half the time you just sat there waiting for people to be quiet and it got really boring really quick!

i had a good time in biology there were times where i didnt like it but overall it was fun ab\nd a learning time

Was difficult at times

I do not think that people who do not want to be in a single sex biology class should be put in one without having some sort of an option wether or not this is something a student wantsd to do

it was ard...could have been better...im just glad this junk is over with

I didn't really like it.

I hated it

no i did very bad and it was some what fun

it was cool i thank i could do better though

its cool having a class full of boys you can say some things that girls wouldn't understand

wasnt fun didnt like the single sex class

biology was kindov of boreing. it was ok i guess compared to all my other classes.

it was fun. the single sex class is alright.

i thought that it was hard

it was fun some days and other days it was boring. i think biology will help students in the long run because mr. ward was an great teacher.

It was ok.

yes single sex i did not like to much

it was boring with no girls to stare at

it was a more violence and sex related class.

I think that it kinda helped being in the same sex class but i wouldnt like it b/c its weird

I did enjoy some parts of biology and the fun we did had.

Cool, bye

It was fun.

It was a very interesting course and I had a fun time in it. I think being in a single-sex class helped a little.

it wuz a very fun class and i enjoyed it very much.and i could say more because i wuz in a single sex class.

i wish ii would have learneed more.....

I felt like I could talk about more things in this class.

it was ok but i liked my other classes more

it was ok

it was fun and i enjoyed it. and i dont think it helped me any

it was good i enjoyed it

i dont like it,i almost failed so yea there u go

It was so much fun. it was easier to talk about things with a class full of girls.

it was kind of fun. NO, NOT REALLY.

It was ok. i learned alot but would like to be in a coeductional class next time.

umm it was okaay i liked it & if i had to be in another class like that like a all qirls class i would.

it was alright through all of it.

nope i hate that stupid class

it was a very great class to have ill will take it agin if i could

it was a blast, i love mrs. XXXXX :)

I would have liked to have had a co-ed class instead. And it was not fun at all.

it was okay

it wus all the time

it wasnt very fun and id like to be with guys.

no. i enjoy it a little.no

The class was ok. I had fun and did better in it than I would be.

it was boring and hard to pass

I think it was fun and I enjoyed it. I liked the single-sex class better because I could pay more attention.

It was fun. i kinda enjoyed it . & yes being in a single sex classed helped.

I enjoyed it, but it was DEFINATELY hard. I do think being in a single-sex class helped me learn more.