

AN EXAMINATION OF THE INFLUENCE OF SINGLE SEX INSTRUCTION ON  
STUDENT ACHIEVEMENT AND BEHAVIOR AT SIXTH GRADE LEVEL AT TWO  
MIDDLE SCHOOLS

by

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(Under the Direction of Charles Reavis)

ABSTRACT

In 2002, the Bush administration inaugurated its signature educational program, No Child Left Behind which included a provision to relax the restrictions of Title IX regarding single sex instruction. Opponents responded by contending there was a lack of credible research on single sex instruction and the proposed modifications were based strictly on the desire to make available to public education the same instructional flexibility exercised by private schools. Supporters of single sex instruction assert that separating the sexes, during middle grades will reduce classroom disruptions allowing increased time on task. Supporters also hold that instructors will employ instructional strategies that address differences in learning styles between males and females. These two factors would, according to supporters, result in improved student achievement and behavior.

This study compared CRCT scores for two years of heterogeneous sixth grade classes in math, reading and language arts to two years of CRCT scores in the same content areas from single sex classes at two different middle schools. Further, in order to determine the influence of single sex classes on student behavior at the sixth grade level, the frequency of disciplinary referrals for two years of heterogeneous classes were

compared to the frequency levels of single sex sixth grade classes at the same two middle schools.

The results of this study indicated there was no statistical difference in CRCT scores between heterogeneous sixth grade classes in math, reading and language arts and those of single sex sixth grade students in the same content domains. Additionally, the results of the study indicated no reduction in disciplinary referrals.

**INDEX WORDS:** Civil Rights, Heterogeneous Classes, Single Sex Classes, Single Sex Instruction, Single Sex Schools, Student Achievement, Student Behavior, Academic Achievement, Public Schools, Standardized Tests, State Standards, Gender Issues, Stereotypes, Educational Environment, Federal Legislation, Learning Differences.

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## DEDICATION

It is with sincere appreciation for her patience and unrelenting support that I dedicate this dissertation to my beloved wife, Rebecca W. Outlaw. This degree was earned not by me alone for without her, this dream would have not been realized.

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## CHAPTER I

### INTRODUCTION

Single sex instruction in public education has experienced renewed interest after having been considered illegal for over thirty years as a result of Title IX legislation. In an effort to improve student achievement, increasing numbers of schools are examining the issue of single sex education (Sax, 2005). Single sex instruction involves the classroom separation of males and females undertaking the same content courses at their grade level. The value of single sex instruction as a tool in increasing student achievement and minimizing undesirable behavior in the classroom is now being examined through expanded research (Haag, 2000).

In 1995, three public schools in the United States offered single sex educational opportunities. In response to the U.S. Department of Education's notice of intent to relax restrictions on the use of single sex instruction in public schools in 2002, the number of public schools offering single sex instruction increased. After approval of the use of single sex classes by the U.S. Department of Education in 2006, the number of public school systems offering single sex classes as an option has continued to grow. As of August, 2007, there were over 399 public schools offering single sex educational opportunities (NASSPE, 2007). Yet, even with increases in the number of public schools implementing single sex instruction, data concerning the effectiveness of single sex instruction is limited. As a consequence, the value of single sex instruction as a means of improving student performance remains unclear.

At the outset, this researcher wishes to address the issue of research bias in this study. Research bias entails the unintentional or other propensity of the researcher to

undertake the research in such a manner as to reach conclusions that support the researcher's pre-conceived perceptions. Researcher bias is a common factor in research by virtue of the fact researchers tend to select topics of interest to them and, by deduction, have a certain level of personal interest and maintain a personal perspective of the topic. This researcher believes single sex instruction can be beneficial to students in middle school and further considers the concept of single sex instruction at the middle school level as theoretically sound based upon personal teaching experience and previous examination of this instructional approach. Further, this researcher believes some level of benefit for both sexes can be realized from this instructional approach with proper training of staff and a well considered implementation process. While this researcher supports the concept of single sex instruction in middle school, every effort toward objectivity has been made in the process of this study in order to minimize researcher bias.

### Background of the Study

#### *Historical Precedents*

Prior to the intervention of local and state governments in the creation of organized and publicly funded education in the form of the common school in the late 1840s (Orenstein & Levine, 1993), private schools catered to the needs of the more affluent families in the United States (Tyack, 1974). These local facilities, primarily in urban areas, addressed the educational needs of males who, by tradition and convention, were considered the future leaders of business and government. These early schools, by design and function, were single sex. Females were considered intellectually inferior and therefore perceived incapable of understanding the intricacies of business and politics

(Hoffman & Hoffman, 1976). In the early 1800s, the extent of formal education available to females was limited to the “dame schools” which provided basic instruction in reading and writing usually taught to neighboring young females in one of the local homesteads (Rose, 2002). Additional formal instruction was considered unnecessary for females during the first half of the 19<sup>th</sup> century because of societal expectations and designated gender roles (Monaghan, 1988).

By the turn of the 19<sup>th</sup> Century, educational opportunities for females had greatly increased due, in part, to the efforts of local and state governments to expand educational opportunities to all citizens and the proliferation of women’s colleges (McClellan, 1992). Yet, even as increases in women’s educational opportunities were realized, the politics of the period actually increased the separation of the sexes in public education. The Progressive Movement, believing the recent wave of immigrants were unfit or disinclined for more formal education, established vocational schools within public schools designed to train males for occupations many of which paid higher wages than those occupations for which females were trained (Salomone, 1999). Further, societal expectations and established gender roles continued to restrict curriculum choices available to females in public education (AAUW, 1998). Also, though public education in the U. S. in the early 20<sup>th</sup> Century was based on a heterogeneous design and some classes were, in fact, heterogeneous, single sex instruction in the K-12 environment was considered an appropriate and frequently used instructional approach (Sadker & Sadker, 1994). Heterogeneous classes differ from coeducational classes in the complexity of composition. Coeducational classes are defined as classes consisting of males and females (Coeducational, 1999). Heterogeneous, by contrast, suggests diversity among

the constituents (Heterogeneous, 1999). The use of the term heterogeneous is used throughout this study because its definition better connotes the diversity existing in the contemporary school environment than the use of coeducational.

There were a variety of reasons for the use of single sex instruction. In some instances, males and females were placed in separate classrooms taking different courses, which were considered appropriate to the gender. For example, males might undertake a vocational course concentrating on job employment skills while females would take home economics as a furtherance of skills required to maintain the household. The objective was equity in the courses offered rather than an emphasis on the type of classes taken or if they were heterogeneous. Other classes, physical education and classes involving possible physical contact were also conducted separately. Finally, some classes were closed to females because of gender stereotypes and perceptions dictating those activities and occupations considered appropriate for females. For example, females in high school might be enrolled in bookkeeping, typing or shorthand courses which provided skills for the types of occupations generally populated by females at that time (AAUW, 1998).

#### Emergent Context

As the 1960s emerged, the social and political climate in the United States began a long and difficult process of change. The World War II generation had yielded over 70 million teenagers, the Baby Boomers (Gillion, 2004). While their parents had struggled to restart their lives in the post-war era, their children had been reared in an environment of unparalleled economic growth and opportunity which fostered a growth in nationalism and idealism (Smith & Clurman, 1997). Aided by the youth, promise and vitality of a



young President, John F. Kennedy, American society experienced an awakening of their social consciousness (Martin, 1993).

One of the residual effects of World War II on American society involved the role of women. Women in America had adequately filled the jobs of the millions of men who had left the factories and farms to fight in World War II. Having experienced the independence that earning a salary provided, the legendary “Rosie the Riveter” had not meekly returned to the status quo ante bellum as had been anticipated. Contrary to previous conventions long held, women in America recognized their accomplishments as well as their potential and considered themselves as an undeniable part of booming U.S. economy, a role they were unwilling to surrender (Halberstam, 1993). Yet, while the American male that continued to dominate American society and enterprise grudgingly accepted the presence of women as workers and economically productive entities in American society, the stereotyping of women and their traditional role in American society continued. Efforts, both unspoken and intentional, were made to restrain the participation of women in the workplace, thereby relegating most to menial functions leaving many without advancement opportunities and little hope of more than they already possessed (Deckard, 1979) .

President Kennedy and other political leaders were becoming aware that women in America could exert considerable political influence at the polls. Seeking to reach out to this large constituency, increasing numbers of professional politicians began to attend to the protests arising from women in America. Kennedy, continuing his efforts to improve opportunities for women in the workplace, stipulated in 1962 that women must receive equal consideration in hiring and compensation in federal employment. In 1963,

Kennedy signed into law the Equal Pay Act which mandated that men and women doing the same job be compensated at the same rate (Davis, 1999).

As the feminist movement continued to grow in 1963, the essence of the movement coalesced in The Feminine Mystique by Betty Friedan. Friedan hypothesized that women in America, at all income and class levels, had been victimized by the archaic belief system that suggests that women can only find fulfillment in life through childbearing and homemaking. According to Friedan, this belief system resulted in women losing their personal identity which denied them the opportunity to express themselves and realize their potential outside the home. Friedan's message resonated among women in America and provided additional impetus to feminine discontent (Cimballa & Miller, 1997).

#### Legislative and Research Contexts

As 1963 drew to a close, so did the presidency and life of John Kennedy, who was assassinated in November, 1963. Lyndon Johnson, Kennedy's Vice-President, assumed the presidency. As is typical of national leadership transitions, especially during traumatic transitions, anxiety and concerns arose among citizens and interest groups as to the priorities of the new administration. Johnson had publicly stated his intention to continue the social policies of his predecessor and as time would demonstrate, Johnson assumed a proactive stance regarding equality among the nation's citizens. (Gittinger & Fisher, 2004).

Within a year of assuming office, Johnson signed into law the Civil Rights Act of 1964 which prohibited job discrimination on the basis of sex and race. In 1965 Congress established the Equal Employment Opportunity Commission to enforce the Civil Rights

Act of 1964. Attempting to address the mounting discontent among Blacks in America and in order to insure continuing efforts toward the equality of the races, Johnson signed into law the Elementary and Secondary Education Act of 1965. The ESEA was the first and largest investment by the federal government in public education in the U.S. history (Jeffery, 1978). The Act provided federal funding for programs expressly designed and targeted toward disadvantaged children in grades kindergarten through 12<sup>th</sup> grade in public schools. Some of the more well known programs associated with the ESEA are Head Start and Title I. Though only authorized for two years, the ESEA has been reauthorized every five years and each renewal involved modifications to the original Act designed to meet the educational agenda of the administration in office at the time of reauthorization (Jennings, 1995).

In 1968, Richard Nixon was elected president. The Nixon Administration, though often associated with the Watergate scandal, has been credited with supporting legislation on several domestic issues designed to increase not only racial equality but also legislation targeting sexual discrimination. In 1972, the Nixon Administration reauthorized the basic provisions of the ESEA of 1965, with certain modifications, as part of the Education Amendments of 1972, created to address specific national educational concerns (Cross, 2004).

The Educational Amendments of 1972 were designed to significantly reduce or virtually eliminate gender bias and sexual discrimination in America. One of its primary provisions, Title IX, dictated that any entity receiving federal funds in any form was prohibited from discriminating on the basis of sex which included public school systems in the U.S. In furtherance of these efforts, regulations were enacted in 1975 directly

related to employment, admissions, counseling and curriculum. Prior to the enactment of the Education Amendments and the associated regulations, public school systems had, for decades, independently made decisions concerning athletic funding, facilities, class room environment (including single sex classes), admissions and other important aspects of the operation of school systems and higher education (Skrentny, 2002).

While neither Title IX nor the regulations adopted in 1975 expressly prohibited the use of single sex classes or schools, a vast majority of public educational systems and institutions, under federal pressure, elected to abandon the practice of single sex classes and schools (Hansot, 1993). Single sex classes were continued in certain areas of the curriculum involved in athletic and physical education activities and sex education. Title IX stipulated that if single sex classes were used, the institution was required to provide comparable academic/athletic opportunities for the underrepresented sex (Streitmatter, 1999).

From the mid 1970s through the early 1990s, interest in single sex classes and schools waned. Part of this declining interest resulted from the merger of formerly single sex male and female schools. Additionally, few efforts were made in public education to return to single sex instruction because of the potential loss of much needed federal funds as well as the threat of prolonged and expensive litigation (Flansburg & Hanson, 1993).

However, as a result of a confluence of social and intellectual forces in the early 1990s, interest in the manner in which young females were being educated in heterogeneous schools increased. This renewed interest in the educational process involving females, would set the stage for a reexamination of heterogeneous classes and

schools, single sex classes and the emerging trend among young females to prefer single sex classes (Salomone, 1999).

In 2001, the newly elected Bush administration began the implementation of its national educational agenda, which included a reexamination of the Education Amendments of 1972 in general and Title IX in particular. While a majority of the Amendments remained incorporated in the Administration's signature education program "No Child Left Behind" (Federal Register, 2002), the legislation included a little noticed provision relaxing restrictions on the use of single sex instruction in public schools, colleges and universities. This modification to Title IX and the suggested relaxation of the Amendment's restrictions on single sex instruction was based on the rationale that public education should have the same instructional flexibility as private institutions. According to proponents of single sex instruction, the same flexibility that enabled students in private schools to excel in their academic efforts should be available to students attending public schools (U. S. Department of Education, 2002).

#### Middle Schools and Single Sex Education

Supporters of single sex instruction, encouraged by these developments, pointed to the long history of single sex instruction in private schools and the perceived benefits realized especially at the middle school level (Alt & Choi, 2000). The middle school level has been and continues to be a period of significant developmental change in students as they enter early adolescence. Efforts to address these considerable individual changes in students began in the mid 1960s, when the present day middle school was referred to as junior high school. During the middle 1960s, the grade configuration of junior high school underwent a series of modifications. Prior to that time, junior high school was

composed of grades seven through nine. As a result of changes in grade configuration, junior high school is now referred to as middle school and consists of grades six through eight (Toepfer, 1990).

The role of the middle school is multifaceted and organized in such a manner as to facilitate these various roles (Becker, 1987). The middle school design is based upon an educational philosophy directed at meeting the more specific needs and interests of students. This design requires staff and faculty committed to innovative instructional approaches involving student grouping by talent and interest rather than by age alone. Middle schools provide an environment which encourages individual instruction and guidance as well as a focus on the entire child instead of solely the child's intellect. Finally, middle schools are designed to assist students in their transition from childhood to adolescence (Epstein & McIver, 1990).

#### Adolescence

Adolescence can be a difficult period for both adolescent and parents. Parents are frequently concerned and confused about the various changes experienced by their child during this time (Steinberg, 1993). This period of personal development is marked by a series of personality changes. Many adolescents experience periods of high expectation tempered by periods of low self-concept. Physically, emotionally and sexually, females mature more rapidly than males. In both genders, there is increased importance placed upon physical and sexual attractiveness. Often driven by hormonal changes, males tend to act out, especially in the presence of female peers. At times, both genders will display childish behavior in especially stressful situations (Furman, 2002).

During early adolescence, both males and females begin to emphasize the importance of body image and begin to experience significant body changes and as the body changes, so begins the search for self. This search involves the experimentation with a variety of identities until an identity is determined which best suits the needs and desires of the individual (Pytel, 2007). The creation of their individual identities is influenced by their environment, especially peers most of whom are found in their school.

The development and maintenance of the individual's position within the social hierarchy in middle school is determined by their interactions with their peers (Steinberg, 1993). For males this interaction is generally competitive in nature and instigated by the need to impress females in the school in general and in the classroom in particular. These efforts to impress their counterparts are often the source of classroom disruptions thereby reducing classroom harmony and time on task as instructors are forced to halt the instructional process in order to address the disruption. The issue of classroom disruption is associated with the sexualization of females and to negative, disruptive behaviors in males. In effect, females distract males on a sexual/hormonal level which is more highly developed than the hormone levels of males at this age. Males, conversely, distract females with their disruptive behavior (Donovan & Jessor, 1985).

This disruptive behavior in middle school, primarily by males, has served as a major factor in increasing interest in single sex instruction. Many educators believe separating males from females in middle school will greatly reduce classroom disruptions resulting from males acting out. By effectively reducing these disruptions, increased time can be used in class for instruction rather than classroom management (Becker, 1987).

## Learning Differences between Males and Females

Supporters of single sex instruction suggest there are fundamental differences in the manner in which males and females learn and if these differences are exploited, student achievement will increase (Feingold, 1994). During the 1960s and 1970s it was generally believed that differences in personality traits between males and females were culturally constructed. It was widely accepted that personality traits were based upon the manner in which a child was reared and if modifications were made in the process to eliminate traditional gender related means of entertainment, clothing, chores, etc., many of the gender differences would disappear. Yet, research over the past three decades suggests that gender differences in personality are prevalent across a variety of cultures (Barnett & Rivers, 2004). Thus, manipulation of personality characteristics or the manner in which males and females are reared does not solely account for the differences in the manner in which both sexes learn.

Some researchers addressing the anatomical differences in brain functioning between males and females suggest there are no differences in what males and females can learn but there are significant differences in the manner in which learning is manifest. Studies indicate males utilize a different area of the brain from females to learn the same information (Sax, 2005). Researchers in the field of learning approaches suggest the inherent differences in brain structure inevitably lead to differences in the manner in which males and females learn and adapt. Current research on brain structure and activity indicates that males tend to be right-brain dominant whereas females tend to left-brain dominant. Therefore, based solely on brain research females, females might be



expected to excel in reading and writing while males might be expected to excel in spatial activities such as math and science.

#### Gay, Lesbian, Bi-Sexual Issues

While the adolescent period is often trying and traumatic under the most usual circumstances, middle school students who do not accommodate the customary paradigm of sexual development face a particularly difficult experience. Middle school students with gay, lesbian or bisexual leanings or those who have recognized and accepted any of these lifestyles as their preferred lifestyle, often are persecuted and the subject of ridicule by their classmates. Frequently, emerging gay, lesbian or bisexual middle school students experience feelings different from their peers. In many instances, there are guilt feelings about their sexual orientation. These middle school students also worry about the reaction of their parents, friends and classmates to their sexual orientation. In other aspects of the middle school experience, gays, lesbians and bisexuals fear discrimination when attempting to join clubs, participation in sports and other intramural activities. The impact of single sex classes on these particular student populations should also be considered in the implementation of single sex classes and warrants further investigation (Besner & Spungin, 1995).

It should also be noted that while the proposed separation of males and females at the sixth grade level would theoretically reduce the sexual tension in sixth grade classes, if either male or female single sex classes include gay, lesbian or bisexual students, the level of sexual tension of the heterogeneous class might well be replaced to some extent with a different type of sexual tension (Herdt, 1989).

### Instructional Approaches

According to detractors of single sex instruction, one of the problems associated with the implementation of single sex classes is associated with the lack of adequate and useful training of instructors in the most effective pedagogical strategies to address learning differences between males and females. This lack of training often results in frustration among instructors who find little progress realized by continuing to utilize traditional instructional approaches in the single sex environment. Single sex instructional programs appear to be more successful when the staff is completely committed to the program and adequately trained in relative instructional approaches. Essential to success is the extensive preparation of the staff and students before the program is implemented, the use of gender specific teaching strategies and an environment in which there is a common objective of increased student achievement and improvements in student behavior (Ferrara, 2005).

In addition to learning differences between males and females, there is the issue of which instructional approaches are best suited to exploit these differences in a positive manner. Researchers have addressed attitudinal differences between males and females regarding school, their instructors and the school environment. Riordan suggest that females considered the instructor as an ally and, with a minimum of encouragement, welcome the instructor's help. Classrooms in which females function best are those they consider safe, secure and welcoming. Further, the use of context enhances learning in females involving the use of background and story telling to set the stage for the exercise. This use of context usually bores males who tend to reach out directly for the

issues or substance of the exercise without fanfare. In regard to instructing males, confrontation is considered beneficial because it requires males to work more diligently and is based on competition and confrontation. Confrontation and competition are not considered beneficial approaches in the instruction of females (Riordan, 1990).

Pomerantz, Altermatt and Saxon note in their work that there are several means of addressing instructional approaches to males and females. Females, according to the article, are more comfortable with cooperative learning exercises and enjoy assignments that are open-ended. Further, females tend to report more verbally and engage in classroom discussions and especially perform well using fiction and poetry. Role playing is enjoyed by females because role playing allows for the summarization of the concepts or material learned. Finally, females tend to prefer assignments involving reading, web searches and assignments which are independent in nature. Females also prefer examinations requiring short answers, prose and verbal reasoning (Pomerantz, Altermatt & Saxon, 2002).

#### Benefits of Single Sex Instruction

Supporters of single sex classes point to research conducted since the early 1990s which indicates single sex instruction provides a variety of benefits to middle schools students. Dean, in her research in 1998 in England, indicated substantial differences in the performance and behavior of males and females in single sex classes.

According to Dean, teachers indicated that females in single sex classes learned at a quicker rate and earned higher academic averages than males. Other teachers suggested that females were easier to teach in single sex classes. Males, according to Dean, also experienced similar benefits if they were kept on task. On the whole, the study suggests

that both males and females were more confident in their academic efforts, less self-conscious about the quality of their work and more inclined to participate in classroom discussions when in single sex classes (Dean, 1998).

There have been numerous studies conducted in England and Australia examining the effects of single-sex classes on student academic attainment. In a longitudinal study lasting 18 years and conducted in Australia, Woodward, Fergusson and Horwood investigated the effects of single-sex and heterogeneous environments on academic achievement. Their results indicated that single-sex schooling for both sexes improved performance, especially in scores on reading tests. Further, their results showed greater school retention and less probability of leaving school which reduces the individual's ability to gain employment. The authors also found that despite factoring in the abilities of students, school behavior and family function, students involved in single-sex schooling tended to out-perform their peers from heterogeneous environments (Woodward, Fergusson & Horwood, 1999).

In 2002, Jackson examined the importance of instructor and overall school support for implementing single-sex classes and noted that introducing single-sex classes into a heterogeneous environment has been considered a primary means of increasing achievement levels of males. While Jackson's study concludes single-sex classes produce substantial benefits for females, the influence of single sex instruction is lower in a heterogeneous environment in which instructional methodologies are not modified to address male learning approaches. Further, potential benefits of single sex instruction are decreased without changes in methodologies because conventional heterogeneous methodologies tend to reinforce undesirable male behaviors (Jackson, 2002).

Disregarding these assertions by supporters of single sex instruction a variety of organizations, most prevalent being civil rights and feminist groups, opposed the relaxation of these restrictions. Their contention was that there is insufficient research to determine the influence (positive or negative) of single sex instruction on student achievement and socialization (Murphy, 2002). Other organizations, while agreeing with this contention, also consider the relaxation of restrictions on single sex instruction as diminishing the progress realized against sex discrimination and gender bias in public education (Gandy, Johnson & O'Neil, 2004).

On October 25, 2006, after a period soliciting public comment concerning the proposal to relax restrictions on single sex instruction, the U.S. Department of Education issued its final approval for relaxing the restrictions on the use of single sex instruction in public schools (Federal Register, 2006).

#### Statement of the Problem

The use of single sex classes in private and public education had been a long standing and time honored tradition prior to Title IX in 1972. However, after Title IX legislation was enacted, the use of single sex classes in publicly funded schools was considered sexually discriminatory by Title IX and, therefore, prohibited unless comparable academic/athletic opportunities were offered to both sexes. Over a period of three decades, Title IX legislation would be challenged in the court system primarily through government instigated litigation. As a result, research addressing the influence of single sex classes on student achievement in public education in the U.S. has been limited until recently after NCLB relaxed restrictions on single sex instruction. Since 2002, increasing numbers of schools have introduced single sex classes in the hopes of

improving student achievement. While there are some studies available concerning single sex instruction in private schools, especially in Europe, there is limited research in public middle schools to examine the effects of single sex instruction instructional settings.

### Research Questions

The following questions will guide this study:

1. Does student achievement in math, reading and language arts, as measured by the CRCT, in either of the two selected middle schools vary by enrollment in single sex/heterogeneous settings?
2. Is there a difference in the frequency of student misbehavior in single sex verses heterogeneous sixth grade classroom environment?

### Significance of the Study

In the present educational environment, entire systems, individual schools, faculty and staff constituting those schools are held increasingly accountable for demonstrating measurable success in educating America's youth. Researchers and relevant government agencies suggest public education in America is surrendering its position of preeminence to other nations, especially in math and science. Still others insist current instructional approaches do not address inherent learning differences characterizing males and females. With these and other issues in mind, many school systems throughout the U.S. are searching for alternative methods to increase student achievement. An increasingly popular classroom pedagogy currently being adopted by some school systems involves the use of single sex instruction, especially in middle grades. Increasing numbers of professional educators in administration and the classroom support the contention that

separating males and females at this pivotal point in their academic careers and personal development will improve student achievement and reduce undesirable behavior thereby allowing for more time spent on content rather than classroom management.

Because of Title IX, which prohibited single sex instruction in public schools without comparable academic/athletic opportunities for both sexes, little pertinent data on the effectiveness of single sex instruction in public education on student achievement and behavior in the U.S. existed prior to the late 1990s. Since the late 1990s, increasing numbers of public schools have implemented single sex instruction thereby increasing the available data. However, though the quantity of data has increased, there exists a significant need for additional data if the impact, or lack thereof, of single sex instruction on student achievement and behavior is to be ascertained.

This researcher considers the proposed study and the data derived from it, a viable contribution to the professional practice of education in the classroom and to educational administrators as efforts continue to analyze the influence of single sex instruction in the public education classroom. This study will provide insight into single sex instruction and student performance/behavior at the sixth grade level since the sixth grade level is considered a pivotal time as students make the transition from elementary school to middle school. Accordingly, professional classroom educators, school administrators, parents, students and other interested parties may benefit from these findings. Such information will allow stakeholders to make more informed decisions concerning the use of single sex instruction in middle grades.

This study, and others of a similar nature, will produce information which can affect policy decisions concerning this organizational design at the state and district

level. Insight into participating teacher perceptions of single sex instruction will afford stakeholders an understanding of this type of instructional environment, the methodology used and anticipated outcomes and then determine individually if single sex instruction is helpful in their academic and behavioral efforts.

Professional educators, parents and taxpayers continue to seek research based programs that will contribute to increased student achievement. Single sex instruction may or may not serve as an additional means to accomplish the common objective of improved student performance and behavior but the potential of the practice deserves inquiry.

This researcher is appreciative for the opportunity to participate in these efforts and to potentially contribute to the accumulation and distribution of knowledge and information to the field of education in general and in the discipline of instructional pedagogy in particular.

#### Research Procedures

This study is based upon a mixed research design using both quantitative and qualitative data. This study will involve two middle schools located in Southeast Georgia. Each of the two middle schools selected for this study will provide data for a total of four years, two years of heterogeneous classes and two years of single sex classes. This study involves two middle schools in southeast Georgia and includes data from each school concerning CRCT scores and disciplinary records for two years before the implementation of single sex instruction and two years of single sex instruction that followed. In this study, the CRCT is the only indicator used and does not include grades, attitudes or extracurricular activities. Thus, the data from each school involves four



years, two with heterogeneous sixth grade classes in math, reading and language arts and two years involving single sex instruction at the sixth grade level in math, reading and language arts.

The content courses which serve as the basis of this study are math, reading and language arts. Science and social studies courses at the two schools at sixth grade were not factored into the study because in the school years 2002-2003 and 2003-2004 (the two school years prior to the implementation of single sex classes) neither school accessed these two courses on the CRCT. The assessment for science and social studies began in school year 2004-2005.

As a note of caution, the researcher has considered the issue of the “placebo effect” in research. The placebo effect, though often associated with medical trials, is a phenomenon based upon expected results from some intervention and, because the placebo effect is psychologically based, the results frequently meet the expectations (Arguriou, 2007). In this study, the placebo effect is the concern that the novelty of implementing the sixth grade single sex instructional program implemented in both selected middle schools will increase expectations of all parties regarding improvements in test scores and behavior. As a result, the CRCT scores and behavior of students might well improve in the short term because of these expectations but may eventually adjust downward as the novelty of the instructional approach wanes.

However, while the placebo effect is an important issue, the influence of the placebo effect may well be mitigated by the fact that the students from the sixth grade single sex classes in math, reading and language arts undertook the same CRCT test that sixth graders in heterogeneous math, reading and language arts classes undertook. Thus,

the results of the tests were determined by the locus of control or the knowledge and skills of the students taking the examination instead of the influence of increased performance expectations.

As a precaution and to examine the influence of the placebo effect, the CRCT scores for single sex sixth grade math, reading and language arts for 2004-2005 will be compared with the CRCT scores for the same single sex classes for the school year 2005-2006 to determine if there is a significant difference in the CRCT scores which might be attributable to the novelty of the single sex program.

The quantitative portion of this study involves two middle schools that will provide test score data (CRCT) for sixth grade students participating in single sex math, reading and language arts classes in school years 2004-2005 and 2005-2006. The same two middle schools will provide test score data (CRCT) for sixth grade students in heterogeneous math, reading and language arts classes for school years 2002-2003 and 2003-2004, two years prior to the implementation of single sex instruction.

The CRCT testing data from both class environments will be analyzed to examine the extent, if any, that student achievement is associated with their enrollment in sixth grade single sex or heterogeneous math, reading and language arts classes.

This study will involve an analysis of CRCT test scores in math, reading and language arts classes at the sixth grade level in the single sex environment as well as a heterosexual environment. This analysis will determine the extent, if any, of significant differences in student performance that can be attributed to the classroom environment. Student performance is defined as the extent of student achievement in math, reading and language arts as measured by CRCT scores from sixth grade students in the two

middle schools for school years 2002-2003 and 2003-2004 during which time both schools offered heterogeneous instruction only and CRCT scoring data for school years 2004-2005 and 2005-2006 during which time the schools offered single sex instruction in the three primary content areas, math, reading and language arts at sixth grade. It should be noted that both schools during the school years 2004-2005 and 2005-2006 offered all classes taught at sixth grade level as single sex classes.

The CRCT is a criterion referenced examination which measures the extent to which students learn, acquire or accomplish knowledge or skills within a certain curriculum or set of specific educational standards. The CRCT is given in the spring of each school year. Because this test is designed by external sources via state contract and scored by that company, the state considers these scores as an accurate assessment of the student's performance in the three primary content areas of math, reading and language arts.

These test data represent those students in these two particular middle schools in Southeast Georgia who were students in single sex math, reading and language arts classes at the sixth grade level in school years 2004-2005 and 2005-2006. The rationale supporting the use of school years 2004-2005 and 2004-2006 in this study regarding single sex instruction rests with the fact the data is relatively recent as well as the limited number of accessible middle schools having a history of single sex instruction of two years or more. Further, the use of two years of data reduces the possibility that the CRCT scores from the selected schools for a single school year were not the result of a novelty effect.

As a means of comparison, the T-Test for statistical measurement will be used to analyze the CRCT scores of sixth grade students in single sex math, reading and language arts classes in school years 2004-2005 and 2005-2006 at the two selected middle schools, the CRCT scores for sixth grade students at the same middle schools selected for this study for the school years 2002-2003 and 2003-2004 will be acquired. During these school years, 2002-2003 and 2003-2004, both schools offered only heterogeneous sixth grade classes in math, reading and language arts.

In order to determine the extent (if any) to which the classroom environment affects classroom behavior of students, the disciplinary referrals for the sixth grade heterogeneous classes of school years 2002-2003 and 2003-2004 will be obtained and compared in frequency to the sixth grade single sex classes for school years 2004-2005 and 2005-2006.

The qualitative research in this study is based upon the use of surveys. Because the instructors in the single sex math, reading and language arts classes have been actively participating in the implementation of this instructional approach, their perceptions of the strengths and weakness of single sex instruction is a valuable tool in the examination of this pedagogy. These perceptions will be garnered through the use of a survey designed to elicit their opinions concerning the strengths and weakness of single sex instruction as well as their opinions concerning the use of single sex classes as a means of improving student behavior. These surveys will provide the instructors a means of expressing their opinions with anonymity which should increase the frankness and openness of responses.

While certainly the perceptions of the instructors in the single sex classes serve as the primary source of qualitative data concerning the use of this instructional approach, the opinions of the administrators who supervise the single sex program are also of interest because their support of the practice can be influential in the success or failure of the single sex instructional program (Parker & Rennie, 2002).

The administrators supervising the single sex instructional program will be provided a survey in order to ascertain their perceptions and opinions concerning single sex instruction. While these administrators have access to testing data which can be used to determine the progress of the single sex program from an achievement perspective, these administrators are often involved in disciplinary issues and can provide an insight to the extent, if any, to which the single sex instruction classroom affected disciplinary issues.

#### Participants of the Study

The direct participants of this study include sixth grade instructors, students and administrators in single sex sixth grade math, reading and language arts classes in the school year 2004-2005 and 2005-2006 at two middle schools located in the Southeast Georgia. It should be noted that the selected schools offered single sex classes in all sixth grade classes which also included science and social studies. Further, all instructors at both schools are female and constituted the existing faculty at each of the selected middle schools. In both of the two selected schools, ABC Middle School and XYZ Middle School, there were no heterogeneous sixth grade math, reading and language arts classes for school years 2004-2005 and 2005-2006.

As a matter of information, the instructors involved in the single sex instructional program at their respective schools were not voluntarily enlisted. The decision to implement single sex classes at the sixth grade level at each middle school was a policy decision of the local school board and implemented at the appropriate site level. To the knowledge of this researcher, none of the instructors involved in the single sex instructional program at the sixth grade level in their school received training in the various aspects of the conversion from heterogeneous to single sex instruction.

Each of the two middle schools offering single sex sixth grade classes in math, reading and language arts possessed variations in the quantity of instructors participating in the program depending upon the student sixth grade population. ABC Middle School was represented by six instructors while XYZ Middle School was represented by twelve instructors. Thus, the selected middle schools used in this study offering single sex sixth grade classes in math, reading and language arts are each represented by a total of 12 instructors from both middle schools.

The direct participants include sixth grade students at the same two middle schools in heterogeneous math, reading and language arts in school years 2002-2003 and 2003-2004, two years prior to the implementation of single sex instruction. The CRCT scores of those sixth grade students in math, reading and language arts for the school years 2002-2003 and 2003-2004 serve as the basis of comparison to those CRCT scores of the same two middle schools that offered single sex sixth grade classes in math, reading and language arts for school years 2004-2005 and 2005-2006.

The student population at the two sixth grades, single sex classes at middle schools selected for this study is delineated by the type of school environment in which

they functioned. School One (ABC Middle School) offers sixth grade single sex classes (School One -SS) in math, reading and language arts. School Two (XYZ Middle School) also offers sixth grade single sex classes (School Two -SS) in math, reading and language arts for the school years 2004-2005 and 2005-2006.

The same two middle schools providing single sex instruction in math, reading and language arts for the school years 2004-2005 and 2005-2006, offered heterogeneous sixth grade classes in math, reading and language arts in the school years 2002-2003 and 2003-2004 and serve as the source of data on CRCT scores for sixth grade heterogeneous classes in math, reading and language arts. These two schools that offered heterogeneous classes in math, reading and language arts in the two years prior to the implementation of single sex instruction (school years 2002-2003 and 2003-2004) and are designated as School One-H and School Two-H.

At School One -SS, (ABC Middle School) there were 108 females enrolled in sixth grade single sex math, reading and language arts classes in school year 2004-2005. In the school year 2005-2006 at the same middle school, 91 females were enrolled in single sex sixth grade math, reading and language arts classes.

Also at School One-SS, (ABC Middle School) there were 115 males in sixth grade single sex math, reading and language arts classes in the school year 2004-2005. For the school year of 2005-2006, there were 98 males in single sex sixth grade math, reading and language arts classes.

For the school year 2004-2005, School Two-SS, (XYZ Middle School) had 139 females enrolled in single sex sixth grade math, reading and language arts classes. The

following school year, 2004-2005, the school enrolled 162 females in single sex sixth grade math, and language arts classes.

School Two-SS (XYZ Middle School) enrolled 143 males in single sex sixth grade math, reading and language arts classes in the school year 2004-2005. In the school year 2005-2006, this middle school had 172 males in single sex sixth grade math, reading and language arts classes.

As a means of comparison of CRCT test scores, the same two schools (School One-H and School Two-H) will be the source of CRCT test scores for sixth grade classes in heterogeneous math, reading and language arts for the two years prior to the implementation of single sex instruction, school years 2002-2003 and 2003-2004.

In school year 2002-2003, School One-H (ABC Middle School) tested 108 males and 124 females in heterogeneous classes in math, reading and language arts. In the subsequent school year, 2003-2004, this school tested 115 males and 99 females in heterogeneous classes in reading, math and language arts.

School Two-H (XYZ Middle School) for the school year 2002-2003 enrolled 144 males and 138 females in heterogeneous math, reading and language arts. In the school year 2003-2004 School Two-H enrolled 151 males and 130 females in heterogeneous math, reading and language arts.

#### Data Collection

The basis of this study is rests with the collection of CRCT testing data from the two middle schools selected for this study. Each of the middle schools selected is located in Southeast Georgia. These two middle schools have been offering single sex classes in math, reading and language arts in sixth grade for over two years which provides the



basis for using this recent data from these two schools. Prior to the implementation of single sex instruction, these two middle schools offered heterogeneous classes in math, reading and language arts as their primary instructional pedagogy in these content domains.

The analysis of quantitative data of this study is based upon a T-Test statistical analysis of CRCT scores for two years between two middle schools offering single sex classes in math, reading and language arts at the sixth grade level and the same two middle schools offering heterogeneous classes in math, reading and language arts at the sixth grade level for the two years prior to the implementation of single sex classes in these content domains.. Thus, the CRCT scores for these two middle schools for school years, 2002-2003 and 2003-2004, during which the schools offered heterogeneous classes in math, reading and language arts, were obtained from the Georgia Department of Education.

The CRCT scores for the same two schools for the school years 2004-2005 and 2005-2006 were obtained from the Georgia Department of Education during which time the schools offered single sex instruction in math, reading and language arts. For each of the two middle schools used in this study, the CRCT data was presented by grade, subject, sex and classroom environment (heterogeneous or single sex).

#### Data Analysis

In order to respond to research question one, the researcher will accumulate CRCT scores among sixth grade students in single sex math, reading and language arts for the school years 2004-2005 and 2005-2006 at two middle schools in the Southeast Georgia and compare these CRCT scores of sixth grade math, reading and language arts

students in classes from the same two middle schools for the school years 2002-2003 and 2003-2004 during which time the same two middle schools offered only heterogeneous classes in math, reading and language arts.

The comparison of these CRCT scores between the two schools offering single sex sixth grade classes in math, reading and language arts in school years 2004-2005 and 2005-2006 and the same two schools offering the same content courses in sixth grade in a heterogeneous environment for the school years, 2002-2003 and 2003-2004, may indicate that single sex instruction in sixth grade math, reading and language arts has little or no influence on student achievement in any or all of the three content courses. The comparison of CRCT scores among the two groups may indicate a negative influence on student achievement in any or all the content courses of math, reading or language arts. Finally, the comparison of CRCT scores may demonstrate an increase in student achievement in either some or all of the specified content courses as measured by the CRCT. Regardless of the results, the comparison of the CRCT scores between single sex math, reading and language arts students in the sixth grade to the CRCT scores of sixth grade students in heterogeneous math, reading and language arts classes establishes the basis for investigating the causes for the results rendered.

This study seeks to address two specific research questions. Question one is concerned with determining if there exist a difference, positive or negative, between student achievement (as determined by the CRCT) based upon their enrollment in single sex or heterogeneous classes at the sixth grade level in math, reading and language arts.

Because many supporters of single sex instruction at the sixth grade level point to the decline of disciplinary issues in single sex classrooms as a contributor to increased

student achievement in that environment, question two addresses the issue of frequency and type of disciplinary referrals in both single sex sixth grade classes as well as the sixth grade heterogeneous classes at both selected middle schools. A comparative analysis of the frequency of disciplinary referrals for both classroom environments at the selected middle schools will be undertaken. This analysis will assist in determining the extent to which classroom environment at the sixth grade level at the selected middle schools influenced student behavior.

#### Limitations of the Study

There are a series of issues and factors which create inherent limitations within this study and include:

1. This study is concerned with sixth grade classes at two middle schools in Southeast Georgia offering single sex math, reading and language arts classes. Further, this study is also limited to the same two middle schools in Southeast Georgia offering heterogeneous classes at sixth grade in math, reading and language arts.
2. This study is based upon CRCT test results for two middle schools in Southeast Georgia that offered single sex instruction at the sixth grade level in math, reading and language arts for the school years 2004-2005 and 2005-2006. The CRCT scores for the same two middle schools in Southeast Georgia that offered heterogeneous classes at sixth grade in math, reading and language arts are limited to school years 2002-2003 and 2003-2004.
3. The selection of CRCT scores for the sixth grade single sex and heterogeneous math, reading and language arts classes was based upon the belief of the researcher

that these three content domains adequately represented portions of the basic curriculum of each of the schools.

4. It is impossible to determine the influence of integrated partnership programs such as the ABC math program on CRCT scores; a program adopted at the same time that single sex instruction was implemented.

#### Delimitations of the Study

This researcher has elected, for purposes of clarity and analysis, to delimit the scope of this study in the following manner:

1. This study is designed to examine the use of single sex education in public education specifically at the middle school level, and more narrowly in sixth grade as early adolescence is a time many schools elect to implement single sex instruction.
2. This study is based upon CRCT and survey data collected from two middle schools in Southeast Georgia, offering sixth grade single sex classes in math, reading and language arts in the school years 2004-2005 and 2005-2006. Further quantitative data is derived from the CRCT scores from the same two middle schools located in Southeast Georgia that offered heterogeneous sixth grade classes in math, reading and language arts for the school years 2002-2003 and 2003-2004. In the case of the two middle schools offering heterogeneous classes in math, science, social studies and language arts, instructors and administrators will not receive surveys.

#### Terms and Definitions

1. Adolescence: That period of physical and psychological development beginning with puberty and ending with maturity generally at the age of majority.
2. Baby Boomers: Generally designates births occurring in the 1950s after the end of

WW II. Their numbers would reach 70 million by the early 1960s.

3. Civil Rights Act of 1964: Federal legislation designed to address poverty and racial discrimination.
4. Heterogeneous: An educational environment in which males and females are instructed in the same classroom or in the same school.
5. CRCT (Criterion Reference Competency Test): A standardized test designed to measure the accumulation of skills and knowledge as prescribed by specific set of standards. This test is used to acquire information on academic achievement at the student, class, school, school system and state level.
6. Dame Schools: Local schools often found in small towns and villages providing instruction in basic reading and writing. These classes usually convened in the home of one of the local families
7. Educational Amendments of 1972: Legislation passed under the Nixon administration further addressing the issue of sexual discrimination. Among the various provisions of the Educational Amendments was Title IX which expressly prohibited sexual discrimination in the nation's public school systems, colleges and universities or any entity receiving federal funds.
8. Elementary and Secondary Education Act of 1965: President Johnson signed into law the ESEA of 1965 to further reduce the impact of poverty and racial discrimination in American society.
9. Heterogeneous: Generally educational classes comprised of diverse and, at times, dissimilar constituents.

10. Junior High School: Prior to the mid and late 1960s, junior high school included grades seven, with and nine. During the 1960s, the grade configuration was changed because, in part, many considered ninth grade as associated with high school.
11. Middle School: That period of public education encompassing grades six, seven and eight. The middle school years are considered by many to be pivotal years in personal development.
12. “New Frontier”: A phrase used by John Kennedy in his inaugural address that symbolized unfulfilled hopes and dreams, problems of war and peace, ignorance and prejudice.
13. Qualitative Research: Unlike quantitative research in which results are presented based upon the accumulation of primarily numerical data, qualitative research is based upon research in which the researcher directly participates in the research process, approaches and interacts with the environment in which the study transpires as well as with the participants of the study. The results of qualitative research are presented in the form of words or descriptors rather than numerically. Qualitative researchers are concerned with process of events more so than the results of these events and, finally, qualitative research is directly concerned with the perspectives and opinions of the participants.
14. Quantitative Research: This time honored research approach involves the systematic inquiry into the relationship between quantitative properties and the phenomena associated with these properties. The objective of quantitative research is to create mathematical models, hypotheses and theories as they pertain

to natural events and phenomena. Quantitative research seeks further to connect empirical observations with the mathematical expression of these relationships.

15. **Research Bias:** The intentional or other propensity of a researcher to conduct their research in such a manner as to enable the results of the research to accommodate the researcher's preconceived notions.
16. **"Rosie the Riveter":** Fictional female worker who replaced men in the factories during WW II and kept the war machine operational and expanding. Became a symbol of female tenacity and achievement.
17. **Single Sex Classes:** Curricular, grade level classes within a school that are based upon the separation of males and females.
18. **Single Sex Schools:** Schools, often private, that cater exclusively to one particular sex. These schools include K-12 and secondary schools.
19. **Stereotype:** Opinions, mental images or perceptions commonly maintained by one group that represents an oversimplified and frequently prejudiced attitude toward members of another group. In this study, the term is used in the context of societal expectations of females.
20. **Student Achievement:** The level of performance demonstrated by students as represented by their scores on standardized tests assessing a given content area.
21. **Title IX:** One of many "titles" or individual sections of the Educational Amendments of 1972 each of which address specific issues which comprise the legislation. Title IX prohibited sex discrimination in public schools and other entities receiving federal funds.

## Summary

The purpose of this study is to examine student performance and behavior in sixth grade based upon enrollment in single sex and heterogeneous classes.

For over three decades, the use of single sex instruction in public schools in the United States has been prohibited by Federal law, specifically Title IX, without comparable educational opportunities for both sexes. In 2002, the Bush Administration, as part of its educational agenda, No Child Left Behind, served notice that the U. S. Department of Education intended to relax restrictions on the use of single sex instruction in public schools. After a period in which public opinion was solicited, the Bush Administration affirmed by law the proposed relaxation of restrictions on single sex instruction in public education in 2004.

With the 2002 notice of intent from the U. S. Department of Education to relax restrictions on the use of single sex instruction in public education, increasing numbers of public schools, primarily middle schools, have implemented single sex instruction. Educators, psychologists and other professionals have suggested the sixth grade to be the most appropriate level to implement single sex instruction because students at this grade level are entering early adolescence, a particularly significant period in the growth process.

The influence of single sex instruction on student achievement and behavior at the middle school level is in question because of the lack of data addressing its value as a means of improving student achievement and reducing undesirable classroom behavior. It is the intent of this study to examine the influence, if any, of single sex instruction on student performance and behavior at the sixth grade level.



## CHAPTER II

### REVIEW OF THE LITERATURE

The practice of single sex instruction in the public school classrooms in the U.S. was virtually discontinued in 1972 with passage of Title IX, a portion of federal legislation directed at reducing sex discrimination in America's public schools, colleges and universities. While Title IX did not specifically prohibit the use of single sex instruction in public education, the practice was not considered conducive to the overall objective of the legislation. Title IX was only one of several amendments attached to the Elementary and Secondary Education Act of 1965 (ESEA, 1965) generated by the Nixon Administration (1968-1974). Title IX and associated amendments to the ESEA are components of the Education Amendments of 1972 (Education Amendments, 1972).

Title IX encompassed state and local agencies receiving funds in any form from the federal government. These agencies include an estimated 16,000 local school systems, over 3,200 colleges and universities, 5,000 for-profit schools, museums and libraries. Further, Title IX directly affected vocational rehabilitation agencies in all fifty states, the District of Columbia, U.S. territories and possessions (U.S. Department of Education, 1997).

#### Historical Context

Title IX was a byproduct of the social upheavals characterizing the 1960s. The decade was significant for several reasons including the escalation of the Cold War, the Arms Race, Space Race and the emergence of the Baby Boomers, some 70 million born during the late 1940s and 1950s (Gillion, 2004). Coming of age at the end of the 1950s,

millions of young adults provided a receptive audience for the promises of a New Frontier under the leadership the youthful President John F. Kennedy. President Kennedy, elected in 1960, became a symbol of a new birth in American nationalism and self assertion. President Kennedy brought with him to the presidency a vision of an America prepared to abandon the caretaker role of government, and instead sought to use government as a tool of change which would transform the nation into an America based upon freedom, opportunity and equality for all citizens regardless of race or sex (Anderson, 1991).

Yet, there remained well intact the vestiges of the patriarchal society which had served as the foundation of U.S economic and global growth for two centuries. The mores and values of this generation, many of whom had seen two world wars, the Great Depression and the Korean conflict, would clash with the emerging concepts of equality, government and social responsibility adopted by the Baby Boomers (Jones, 1980).

The explosive economic growth of the 1950s provided the foundation for the highest standard of living in U.S history by 1960 (Smith & Clurman, 1997). The Cold War generated not only an underlying sense of fear among America's citizens of imminent nuclear destruction but also justified the intensified growth of the military-industrial complex to address those fears through weapons development. The Cold War mentality also provided impetus for the Space Race and the Arms Race both of which generated thousands of jobs and contributed significantly to the economic dynamics of the time (Brown, 2001).

During the early years of the 1960s, American society began to emerge from it's historical complacency, a condition rooted in the paradox of benevolent stratification, a

malaise supported by society's superficial insistence that all citizens are equal while enabling and officially sanctioning blatant inequalities among the races and sexes. This awakening of social consciousness found its birth in two emerging social movements, the Civil Rights Movement and the Women's Movement (Winders, 2004).

### The Civil Rights Movement

The Supreme Court, in the *Brown v The Board of Education* in 1954, had nullified the constitutionally protected concept of separate but equal rendered by the Court's 1896 decision in *Plessey v Ferguson*. The *Brown* decision established the basis for the desegregation of American society (Dudley, 1994). Yet, while the high court demonstrated its readiness to end the centuries old practice of segregation, American society was hesitant to accept this considerable mandate. In fact, it would take three years before the full force of the decision would become manifest and then the initial tentative efforts toward enforcement would require federal intervention to insure the decision's implementation in Little Rock, Arkansas. In the Deep South, initial efforts toward implementation of the *Brown* decision would require almost a decade or two and, again, would demand the exercise of federal power to insure compliance (Clark, 1993).

By the mid 1960s the Civil Rights Movement had gained significant momentum through the efforts of Martin Luther King, Jr. and the Southern Christian Leadership Conference. The young organization staged a series of nationally publicized boycotts, marches and sit-ins. Images of peaceful, unarmed marchers under attack by police dogs and fire hoses in southern cities illuminated the screens of televisions across America and coerced American society into recognizing that Blacks in America were unwilling to continue to accept the historical status quo (Williams, 1987).

The United States government in the mid 1960s also recognized that further intervention was necessary to advance the cause of equality among the races and in 1964 President Lyndon Johnson signed into law the Civil Rights Act of 1964 which prohibited racial *and* sexual discrimination. A year later, President Johnson also supported the enactment of the Elementary and Secondary Education Act of 1965 a series of educational provisions designed to further address the issues of racial/ sexual discrimination and poverty (Jeffery, 1978).

As the sixties closed, racial tension in the U.S. reached a high point as radical groups spawned violent demonstrations in the nation's larger cities while in the south, Black demonstrators in sit-ins and marches experienced the outbursts of anger and frustration felt by segregationists possessing a much different perspective. In April, 1968, American society imploded with the assassination of Martin Luther King in Memphis, Tennessee. Thus began the long process of recriminations, placing of blame and introspection (King, 1969).

#### The Women's Movement

As the new decade of the sixties began, women in America were, with increasing volume, raising their voices in protests of discrimination in hiring, compensation and their constrained position in American society. As their protests multiplied so did their numbers as did their political influence on the national scene. Heeding the growing movement to equalize opportunities for women in the workplace, President Kennedy established the National Commission on the Status of Women in 1961. The Commission was chaired by Eleanor Roosevelt, a revered women's right activist with a reputation of

being a force of change in her own right, and possessed a mandate to examine the issues of women's rights, equality and opportunity (Martin, 2003).

American society, long steeped in traditional racial and gender roles, appeared wholly unprepared for the increase in racial activism and the struggle to adjust was exacerbated by the relatively sudden but insistent demand for sexual equality by the emerging women's movement (Cimballa & Miller, 1997).

The issue of women's rights has a long and storied history in the U.S. In 1776, Abigail Adams had implored her husband, John, to remember women as the newly formed government worked to establish a basic uniform code of laws for the nation. Ironically, after the creation of the U.S. Constitution, one of their most valuable symbols of their previous progress, the right to vote, was reversed as several states enacted legislation revoking this right. By 1777, all states had pass legislation reversing the right to vote for women (Krichmar, 1972.) Twelve years later the U.S. Constitution was ratified which included language used to describe citizens in such an ambiguous manner as to allow the states to interpret if the term citizen included males and females. Decades passed with little noticeable progress. However, forty years later, progress was realized as the State of Mississippi granted women the right to own property in their own name with permission of their husband in 1839 (Catt & Shuler, 2004).

Historically, the Seneca Falls, NY convention in 1848 is considered by many as the beginning of the women's movement in the U.S. (Brody, 2000). At this meeting, over 300 men and women signed the Declaration of Sentiments, a document designed with the Declaration of Independence in mind and based upon the same issues of liberty and equality. The Declaration of Sentiments, authored by Elizabeth Caty Stanton,

enumerated eighteen specific grievances, the same number of grievances listed in the Declaration of Independence (Stansell, 1998). After several days of discussion, twelve resolutions were adopted by the convention. The public backlash was predictable and the convention was ridiculed in national newspapers and other venues. However, women's rights conventions were regularly convened from 1850 to the Civil War with the primary objective being the right to vote, a vehicle critical to attaining other reforms. It would take 72 years for the movement, consisting of males and females, to attain this singular objective (Miller, 1995).

The women's rights movement of the 1960s is often considered the second wave of feminist activism. The rejuvenation of the women's movement began with a series of seemingly unrelated events and contributing factors. A new generation of American women had been born to the women who had fought and won recognition by their efforts in the nation's factories during WW II and these daughters carried their mother's cause into the 1960s (Anderson, 1991).

In 1961, President Kennedy appointed Ester Peterson as director of the Women's Bureau in the U.S. Department of Labor. Peterson was concerned about the discrimination of women in the workplace and encouraged President Kennedy to take action to address these issues. President Kennedy created the Commission on the Status of Women with Eleanor Roosevelt as its Chairperson. The Commission began an inquiry into the issue of discrimination against women in the workplace and in its 1963 report the Commission detailed numerous examples of discrimination against women prevalent in American society. Shortly after the issuance of the Commission's report, the various

states formed their own commissions to examine the issue of sexual discrimination and institute changes deemed appropriate (Martin, 2003).

Betty Friedan authored The Feminine Mystique in 1963. In her work Friedan addressed the stereotypical belief system that women only found fulfillment in childbearing and the creation and maintenance of the family. Friedan suggested that this belief system had over the centuries limited the realization of the potential of women in society. Friedan further noted that this belief system diminished the individual identity of women and thereby inhibited the individual woman from developing and expanding her personal identity (Friedan, 1963). Also, in 1963, President Kennedy signed into law the Equal Pay Act. This Act required equal compensation for equal work regardless of the sex of the worker (Crampton, Hodge & Mishra, 1997).

The Women's Rights Movement, by the mid 1960s, had recognized the ongoing success of the tactics employed by the Civil Rights Movement and would later use some of these tactics including marches and protests. Because the movement was comprised primarily of middle class women, the spirit of rebellion often demonstrated in other areas, including the Vietnam War, was preexisting. Another contributing factor to the development of the second wave of women's rights was the sexual revolution, also a factor in the activism of the middle class, which found its origin in the widespread availability of birth control (Echols, 1994).

The death of President Kennedy at the end of 1963 created a period of national uncertainty as the new president, Lyndon Johnson, assumed office, even though Johnson had indicated he planned to proceed with the social agenda initiated by President Kennedy. In February, 1964, the U.S. Congress passed the Civil Rights Act of 1964,

legislation suggested by President Kennedy in June, 1963. Passage of the Act was not, however, without contention. Leading conservatives in Congress, considering the legislation too liberal, hoped to defeat the measure by proposing an amendment to make racial *and* sexual discrimination illegal thereby making the legislation increasingly unattractive to fellow conservatives. This tactic resulted in the exact opposite effect as the amendment and the bill was approved by Congress providing women with the legal tool required to secure their rights (Gold, 1981). In 1965, the Equal Employment Opportunity Commission (EEOC) was formed to enforce the Civil Rights Act of 1964 (Danovitch & Masugi, 1990).

The victory attained in the passage of the Civil Rights Act of 1964 emboldened the women's movement as women in America began to recognize their own social and political power. In 1966, Betty Friedan and twenty eight professional women formed The National Organization for Women (NOW). The objective of NOW was to propel women into full participation in the mainstream of American society. NOW was founded upon a multi-faceted agenda involving attaining equal rights insured through a constitutional amendment, reproductive independence and other women's health issues, opposing racism and bigotry toward gays and lesbians as well as seeking to end violence against women (Krichmar, 1972) .

From 1964 forward, the organization experienced a series of transformations in their agenda, organization and approaches to fostering progress. As NOW refined their agenda, increasing support was realized among mainstream Americans and politicians responsible for legislation that impacted NOW's efforts. Actively employing lobbying, boycotts and proclamations NOW pursued their various agenda (Gilmore, 2003). In



1965, President Johnson signed Executive Order 11375 stipulating that women and minorities must be considered in the assignment of federal contracts and that the federal government would insure that women and minorities have access to the same educational and employment opportunities as white males. This approach to insuring equal opportunity and access to minorities and women would later become known as affirmative action (Garcia, 1997).

The first national women's liberation conference was convened in 1968 in Chicago and in the same year, the National Abortion Rights Action League was formed. Also in 1968, Shirley Chisholm became the first Black woman elected to the U.S. Congress. During the same timeframe, the EEOC ruled that sex-segregated public employment recruitment ads were sexually discriminatory and the U.S. Supreme Court affirmed that decision. This ruling enabled women to apply for publicly advertised positions that had been exclusively within the male domain. Further, this ruling afforded females the opportunity to compete with males for positions that offered higher levels of compensation than positions traditionally offered to females responding to sexually segregated recruitment ads (Cobble, 2004)

### The Emergence of Title IX

The year 1972 was a pivotal year for NOW and all American women and especially those in the nation's public schools. On June 23<sup>rd</sup>, President Nixon signed into law the Educational Amendments of 1972 which served as an addendum to the Elementary and Secondary Education Act (ESEA) of 1965 (ESEA, 1965). Included in the Educational Amendments was Title IX the purpose of which was to address sexual discrimination in America's educational systems (Fishel & Pottker, 1977).

The Educational Amendments of 1972 were readily passed by Congress with marginal opposition. However, as the full impact of Title IX became apparent for members of the NCAA (The National Collegiate Athletic Association) and high school administrators, protests commenced that suggested that if female sports programs were funded at the same level as male athletic programs, the male athletic programs would suffer by reduced funding. These complaints, and others signaling resistance and confusion concerning Title IX, led to the publication of regulations guiding the provision's implementation. These regulations established a three year period for educational institutions to comply with the provisions of Title IX (Simon, 2004).

The original intent of the legislation was to eliminate or greatly reduce gender bias in athletics in public schools, colleges and universities receiving federal funds (Skrentry, 2002). Until the appearance of Title IX, male dominated athletics attracted the majority of extracurricular funds in public education especially at the secondary level. This inequity in funding left female oriented athletic programs at a distinct disadvantage with regard to funding facilities and equipment (Blum, 1995). Additionally, prior to Title IX, the disparities in operating budgets between male and female athletics programs tended to prohibit coaches in some female sports from attracting participants, providing uniforms and paying for travel expenses for the team. This is not to suggest that Title IX required equal budgets for male and female programs. Title IX was designed to insure that male and female programs received the same level of service, facilities and supplies.

Almost every aspect of educational life, especially at the secondary level, is impacted by Title IX. Policies and procedures governing institutional recruitment, admissions, financial aid as well as counseling and the selection of academic programs

are subject to adjustment in order to insure compliance with Title IX legislation (Sadker & Sadker, 1994).

Title IX requires comparable facilities, staffing and access to educational opportunities as well as academic and athletic programs for males and females in public school systems, colleges and universities. Educational institutions receiving federal funding were prohibited from providing separate classes based upon sex unless the underrepresented sex had comparable facilities and opportunities. There were some exceptions, however, regarding the use of single sex classes. For example, schools could limit the inclusion of opposite sexes in classes directed at sex education, chorus and physical education courses requiring significant body contact (Suggs, 2005).

In order to comply with Title IX, institutions were required to demonstrate compliance with one of three criteria:

1. There should exist proportionate athletic and academic opportunities for male and female students based upon population ratios.
2. A history and continuing practice of expanding athletic and educational opportunities for the sex considered underrepresented.
3. A recognition and accommodation of the abilities and interests of the underrepresented sex. Institutions are not required to offer identical sports programs but they are required to provide equal opportunities for the underrepresented sex to participate in sports of interest (Carpenter & Acosta 2005).

## Impact of Title IX

In June, 1997, on the twenty-fifth anniversary of Title IX, then U. S. Secretary of Education, Richard W. Riley, commissioned a report, Title IX: 25 Years of Progress, examining the influence and impact of Title IX on public education in the U. S. While suggesting considerable work remained in the ongoing effort to free American public education of gender bias and sex discrimination, Secretary Riley praised some of the advances realized since the enactment of Title IX. According to the report the following sample of benefits have been realized from Title IX:

### A. College Enrollment:

1. In 1973, 43 percent of female high school graduates aged 16-24 were enrolled in college. By 1994, that number had increased by 20 percentage points to 63 percent.
2. In 1971, 18 percent of young women and 26 percent of young men had completed four or more years of college. In 1994, 27 percent of both men and women had earned a bachelor's degree.

### B. Graduate and Professional Degrees:

1. In 1994, women received 38 percent of medical degrees. In 1972, the year Title IX was enacted, only 9 percent of women received medical degrees. In 2004, females received 25 percent of dental degrees in the U.S. In 1972, only 1 percent of dental degrees.
2. In 1994, women earned 43 percent of law degrees, an increase of 36 percentage points from the 7 percent of law degrees earned by women in 1972. In 2004, almost 50 percent of law degrees were awarded to females.

3. In 1977, women earned 25 percent of doctoral degrees in the U.S. In 1994, this number had increased to 44 percent ((U.S. Department of Education, 1997).

Yet, these advances were not arbitrary in their development. The U.S. government, through its various agencies, including the U.S. Department of Education and the Office of Civil Rights, employed a variety of tactics to induce compliance at every level of the nation's educational system. One of the more effective approaches to insure compliance by school systems was the threat of loss of federal contributions to the state. While the actual level of federal funding to school systems is a relatively small percentage of the average state system's budget, many of the nation's public school systems have become dependent upon these funds to supplement state and local funding of education (Haag, 2002). Threats by the U.S. government to terminate contributions to educational funding at the state and local level served to restrain efforts to implement programs in conflict with federal mandates. Further, the threat of litigation by the federal government against school systems in non-compliance also restricted local school systems from considering programs contrary to the requirements of the U.S. Department of Education, a government entity supported by the full force and resources of the U.S. government (Datnow & Hubbard, 2002).

In the intervening years since the enactment of Title IX, there have been numerous civil cases involving alleged violations of the statute most of which had little national impact. However, there are two examples of litigation, one initiated by the U.S. Department of Justice and the other by the American Civil Liberties Union (ACLU), both of which gained national attention and have come to symbolize Title IX enforcement.

The Virginia Military Institute (VMI) was founded in 1839 and was the nation's first state supported military academy (Goree, 1997). The Academy was sued by the U. S. Department of Justice in 1990 for sex discrimination based upon the institution's male only admissions policy in view of the fact the Academy received federal funding, and thus, was in violation of Title IX. In the interim between 1990 through 1997, VMI had repelled the court challenge in Federal District Court through a series of appeals. As the appeals process proceeded VMI had attempted to comply with the comparable facilities and opportunities provisions of Title IX by establishing a female military academy at Mary Baldwin College some thirty miles from the main VMI campus in Staunton, VA. In June, 1996, the case reached the Supreme Court which struck down the Federal Court of Appeals ruling that had acquitted VMI of the alleged Title IX violation based upon its establishment of comparable facilities and educational access at Mary Baldwin College. The Supreme Court found VMI's all male admission policy unconstitutional on the grounds the institution was supported by public funds. Attempts by VMI to establish a comparable female military academy at Mary Baldwin College was not considered by the Court as comparable with academic, athletic and extracurricular programs at the primary VMI campus (United States v. Virginia, 1996).

In the other case, Shannon Faulkner made application for admission to The Citadel in 1993. The Citadel, located in Charleston, SC, was a state supported, all male military academy founded in 1842 by the South Carolina Legislature. The Citadel, having originally approved Ms. Faulkner's admission, rescinded its decision upon learning of the applicant's gender. The American Civil Liberties Union sued the Citadel for sex discrimination.. The Citadel received federal funds as a portion of its annual

operating budget and as a recipient of these funds was alleged to be in violation of the sex discrimination clause of Title IX. During the subsequent two years after the filing of the suit, the Citadel attempted to mitigate the court challenge by establishing a separate, all female military college on the primary Citadel campus at a cost of \$7 million. Another \$6 million was spent by the Academy, its alumni and the State of South Carolina in litigation before the Supreme Court issued its decision, in June, 1996, finding The Citadel in violation of the sex discrimination provisions of Title IX (Streitmatter, 1999).

While these cases and others were effective in curtailing non-compliance with Title IX, including the use of single sex instruction, interest and research regarding student achievement expanded in the 1980s after a series of reports critical of the achievement levels of the nation's students. Ronald Reagan's Secretary of Education, Terrell Bell, released an education commission report in 1983 that further contributed to the debate over educational policy and government's role. This report, A Nation at Risk, suggested that America's elementary and secondary schools were failing in their efforts to educate America's youth to compete on the world stage with the nation's primary competitors. As a result of this report, numerous states developed educational policies based upon establishing achievement and performance standards that strengthened graduation standards (Coeyman, 2003).

In 1994, President Bill Clinton signed into law Goals 2000: Educate America, legislation requiring as a national goal that all students in the nation's school system demonstrate proficiency in math, science, history and language arts (Stedman, et al 1993). This legislation provided the foundation for further federal involvement that

would become No Child Left Behind, the signature educational agenda of the Bush administration from 2001 to the present (NCLB, 2001).

### Renewed Interest in Single Sex Instruction

Increased concern by federal and state governments on the effectiveness of the educational systems of the various states resulted in an increased interest in the manner in which students were instructed. Various instructional approaches were examined by policy makers and professional educators and entrepreneurs led the way in creating instructional programs many of which anxious school systems were quick to implement. During this time, researchers, especially in Europe, were beginning to examine more closely the used of single sex instruction as a means of increasing student achievement, an educational practice with a long history in Europe (Ferrara, 2005).

By the early 1990s, there was increased interest in single sex instruction as a means of controlling behavior in the classroom especially among early adolescent students based upon the premise that if students were separated by sex there would be fewer classroom disruptions thereby allowing more time for instruction. Others supported separating the sexes for academic reasons. For example, research indicated that males tend to dominate math and science classes and therefore limit female participation and learning. This reduced opportunity in the classroom resulted in lower performance by females in these two content areas on standardized assessments. Further, supporters contended that this environment had a negative impact on the self esteem of female students. A third group, primarily scholars and researchers, pointed to newly expanding field of genetic research in brain differences which led to contrasts between how males and females learn. According to some studies, males and females learn



differently because of genetics and the manner in which the brain of each sex functions and these functional differences in learning approaches serve as a justification for a reexamination of single sex instruction (Sadker & Sadker, 1994).

#### Early Research on Single Sex Instruction

Some of the earliest research undertaken on single sex instruction after the enactment of Title IX began a decade later. In 1982, Trickett and Trickett published an article in the Journal of Educational Psychology in which they examined the normative environment of single sex and heterogeneous secondary schools. In a comparison of single sex and heterogeneous schools in the U.S., the authors found that students in single sex classrooms possessed a more positive attitude toward academics than did students in heterogeneous classes. Additionally, the study indicated that students in single sex classes were more involved in classroom discussions and activities as well as being more organized (Trickett & Trickett, 1982).

During the late 1980s, social researchers, Brown and Gilligan, challenged the generally accepted psychological theory supporting attaching positive association with characteristics considered masculine including abstract thought, subordination of relationships, detachment and separation while attaching negative connotations to personality traits such as compassion, attachment and inter-dependency, all attributes generally associated with females. The researchers suggested in their 1993 report that distinctions existing between males and females were not derived from inherent differences between males and females but from socialization, societal expectations and biological differences which compelled varying life experiences (Brown & Gilligan, 1993).

By early 1990 several researchers began to generate data on single sex classes at secular independent and Catholic private schools. A series of observational studies by David and Myra Sadker resulting in their book, Failing at Fairness, expanded the debate on single sex education from academia to the general public. The authors, using data from over one hundred classroom observations, noted that males dominated classroom discussions and were the object of the instructor's praise, criticism, correction and assistance more often than females in the observed classes. Each of these factors, the authors noted, are integral to student achievement (Sadker & Sadker, 1994).

In 1990, Riordan had noted in his work Girls and Boys in School: Together or Separate, that in the American educational system, the instructional problem arises from the concept that students, especially at the middle and high school levels, should be educated in the same manner at the same time thereby ignoring learning differences between the sexes, the genetics of brain function, and the influence of environment on the learning process (Riordan, 1990).

The American Association of University Women (AAUW) commissioned a poll directed at females aged 9-15 in heterogeneous classes in public schools in the U.S. The report, Shortchanging Girls, Shortchanging America, attempted to address personal attitudes for females in this age group concerning self esteem, willingness to assert opinions and reasons for their low interest in math and science. This research, based upon a nationwide poll including female students ages 9-15, found that as females enter into adolescence, many experience a considerable decrease in self-esteem more so than males. Further, the study also suggests that females are systematically, if unintentionally, discouraged from seeking involvement in a variety of academic pursuits especially in

science and math. This decrease in self-esteem and loss of interest in math and science has ramifications later as females seek admission to colleges or enter into career paths which, in turn, have negative implications for the nation (AAUW, 1991).

A year later, another study was commissioned by the organization. This 1992 report, How Schools Shortchange Girls, examined the manner in which classroom environment and teacher bias impacted female achievement in heterogeneous classes. This report found that males in K-12 heterogeneous classrooms received more attention than females in the class from instructors and suggests that instructor bias involving females in the classroom can actually be subdivided. Black females, according to the study, are more likely to be ignored or rebuffed by instructors than White females. Other findings of the report suggested that females were not pursuing math and science related courses in proportion to males. In regard gender bias in other areas, the report indicated that the curricula of many schools either ignore females or stereotype them and that many elements of standardized assessments are biased toward male students (AAUW, 1992).

#### Failure of Early Reforms

By the mid 1990s, there was a general consensus among policy makers, educators and parents that persistent problems continued to exist with the nation's educational system in spite of the reform efforts of government, educators and other vested interests. Student achievement, especially in math and science when compared to other nations, was decreasing. Other issues including gender equity in the classroom were attracting increasing attention from educational professionals, policy specialists and government at the state and national levels. The problem of student achievement, while

important, was symptomatic of more complex problems in curriculum, pedagogy, male and female relations, learning environments, sexual inequities, academic expectations and learning opportunities (Blair & Sanford, 1999).

David and Myra Sadker, in 1994 published Failing at Fairness in which they suggested that American public education has provided males with better opportunities in school than for females especially in the middle and high school years. Echoing some of the findings of the 1992 AAUW report, the Sadkers noted that males receive from instructors more attention and stimulation in the classroom as well as more positive feedback regarding their participation. Females, conversely, are rewarded for physical appearance, conforming and positive behavior instead of academic effort (Sadker & Sadker, 1994).

#### Modifications to Title IX

On Oct. 6, 1999, U.S. Senator Kay Bailey Hutchinson (Rep. Texas) introduced in the *Congressional Record* an amendment to the renewal of No Child Left Behind which would provide students in public schools the opportunity to select single sex instruction and classes. Senator Hutchinson justified the need for this option for students and schools based upon research supporting the use of single sex instruction as a means of improving student achievement as well as proposing that such flexibility would provide parents and students with additional instructional options (Office of Civil Rights, 2002).

In 2001, the Bush Administration reaffirmed the government's support of the ESEA and Title IX including its provisions in the Administration's signature education policy, *No Child Left Behind* (No Child Left Behind, 2001). However, attached to this legislation was a suggested modification to the Title IX mandates affording public

schools the opportunity and flexibility to experiment with single sex instruction thereby removing the threat of litigation which had prohibited such flexibility in the past.

The intent to relax Title IX restrictions on single sex classes was immediately recognized by educational policy professionals and created a substantial controversy especially from feminists, women's equity and civil rights groups. As early as 1998, detecting a change in official sentiment toward single sex instruction within the U.S. Department of Education, The American Association of University Women issued a position paper, Separated by Sex: A Critical Look at Single-Sex Education for Girls, condemning single sex instruction as regressive and a threat to progress made against sexual discrimination realized by Title IX (AAUW, 1998). Proponents of single sex instruction, the most vocal being the National Association for Single Sex Education, praised the perspective changes in Title IX as a major and positive step forward in educational reform addressing sex related learning differences and providing much needed instructional flexibility (Sax, 2005).

While the issues of flexibility and parity in instruction are important among supporters and opponents of single sex education, the issue of primary concern is the benefit, or lack thereof, and potential associated problems of single sex education (Haag, 1998). Proponents suggest single sex instruction affords the flexibility to address learning differences they consider an important influence on student achievement. For many opponents of single sex instruction, the potential for negative results from sex discrimination and gender bias as well as fearing a regression on progress realized in these areas are of greater concern (AAUW, 1998).

A variety of special interest groups expressed skepticism about the Bush Administration modifications to Title IX allowing for the use of single sex classes in public schools. In an article in the Journal of Blacks in Higher Education, Balkin noted with concern that the Bush Administration had exhibited little hesitancy in modifying some of the most basic and important tenets of Title IX, especially those protecting females from sex discrimination and providing for equal educational opportunities. Balkin questioned if other modifications affecting the civil rights of other groups are forthcoming and expressed his concern that the progress realized by Black Americans since the Brown decision of 1954 would be diminished (Balkin, 2002).

Other groups, including the National Association of Educators, have voiced their displeasure with the modifications to Title IX allowing single-sex classes. The NEA called these changes in Title IX allowing single-sex classes “bad educational policy” because there is actually no research confirming any benefits of single-sex classes (AAUW, 1998).

#### The Middle School as Pivotal for Single Sex Instruction

While the modifications to Title IX relaxing restrictions on single sex classes applies to all levels of public education, most educators associate single sex instruction with the middle grades, six through eight. Grades prior to six through eight allow students to become acclimated to the school environment, schedules, expectations and the socialization process. Research has shown that as students become older and more mature at the high school level, the less effective single sex instruction becomes. Thus, grades six, seven and eight are considered the more appropriate levels at which to optimize single sex instruction (Alt & Choy, 2000). Further, because research has

demonstrated that individual motivation declines among students making the transition from elementary school and because adolescence is a period of significant individual change, many researchers consider the middle school period critical to the development of learning approaches, socialization and goal development (Eccles & Midgley, 1989).

Educators have long known that the middle school period is a significant time in life, a time in which the individual will experience considerable change and at a pace faster than at any time in life. The needs of these students are unique from those students at the elementary or high school level. During the middle grades, it is important for students to experience success in their endeavors to provide a foundation for the continuing growth of self esteem. However, it is also important that during the middle school years students are provided with choices supported by accountability for their choices. Further, during this period, students are faced with the serious challenges of standardized testing; the success of their efforts is considered to be reflected in the results of these standardized assessments (Ecker, 2002).

While many researchers seek to demonstrate a correlation between single sex instruction and student achievement, other researchers seeking to examine the influence of single sex instruction on self esteem and motivation especially concerning students in middle and secondary levels. According to the findings of a study conducted by Salomone, as the number of students entering single-sex classes has expanded, it would appear there is less stereotypical and more positive attitudes toward academic subjects which have been traditionally considered associated with males or females (Salomone, 2003). In her research published in 1999, Janice Streitmatter noted that females in a single sex educational environment experience increased self-esteem,

involvement in leadership activities and increased interest in math and science (Streitmatter, 1999).

In order to obtain a preliminary assessment of the potential significance of single sex instruction at the middle school level, it is necessary to examine the organizational structure and components comprising the typical middle school. The organizational design and function of its components, while interdependent, are particular to the middle school. The middle school is designed specifically to meet the unique needs of students who, because of maturing processes, are experiencing a multitude of physical, emotional, psychological and intellectual changes in their development (Alt & Choy, 2000). Additionally, it is necessary to explore learning differences between males and females for it is these learning differences upon which proponents of single sex instruction base their positions while opponents suggests these learning differences are not sufficiently significant to support single sex instruction(Sax, 2005).

The role of the middle school is multifaceted and, therefore, is organized in such a manner as to facilitate these various roles. Middle school design is based upon an educational philosophy directed at meeting the more specific, individual needs and interests of students. Students at the middle grades level seek independence and yet, at times, prefer to be more dependent. Additionally, adolescents are searching for their personal identity and peer acceptance as well as a clear perspective of self image (McAdoo, 1999). The pedagogy and curriculum of the typical middle school is designed to address these individual needs through collaborative teaching, an integrated curriculum, cooperative learning and small learning communities. (Chadbourne, 1999). This design requires staff and faculty committed to innovative instructional approaches



and student grouping by talent and interest rather than by age alone. Middle schools provide an environment which encourages individual instruction and guidance as well as a focus on the entire child instead of solely the child's intellect. Finally, middle schools offer a means of transition from childhood and adolescence (Battaglia & Randall, 2005).

Adolescence can be a difficult period for both adolescent and parents. Parents are frequently concerned and confused about the various changes experienced by their child during this time (Steinberg, 1993). This period of personal development is marked by a series of personality changes. Many adolescents experience periods of high expectation tempered by periods of low self-concept. Physically and sexually, females mature more rapidly than males. In both sexes, there is an increased importance placed upon physical and sexual attractiveness. Often driven by hormonal tendencies, males tend to act out, especially in the presence of female classmates. At times, both sexes will display childish behavior especially in stressful situations (Brownlee, 1999).

It is this immature behavior in middle schools, especially on the part of males, that has generated increasing interest in single sex instruction. Many educators believe separating males from females in middle school will greatly reduce classroom disruptions resulting from males acting out. By effectively reducing these disruptions, single sex instruction can provide more class time for instruction rather than classroom management (Lee & Byrk, 1986).

### Learning Differences

Proponents of single sex instruction have long suggested that males and females learn differently and because of these differences, the heterogeneous classroom does not address the learning needs of either sex. Halpern notes that while no single study has

unanimous support, conclusions drawn from multiple studies suggests that females tend to score higher on tasks requiring rapid access to and the usage of semantic and phonological information in long term memory. Further, these conclusions also indicate females perform at higher levels than males in the production of refined motor skills, the creation and comprehension of complex poetry and prose and speed of perception. Males, on the other hand, tend to excel in tasks requiring transformations in visual-spatial working memory and fluid reasoning ability especially in abstract scientific and mathematical domains (Halpern, 2000). While there is considerable research recognizing learning differences between males and females in social settings dating back decades, instructors fail to appreciate the differences gender makes in learning, especially in a heterogeneous classroom (Zittleman & Sadker, 2003).

Concern about learning differences emerged as a by-product of the feminist movement of the last decade. Feminist activists argued that females should have access to high level courses often associated with males such as advanced math, science and technology. These arguments, in the mid-1990s, led to a small but persistent increase of single-sex classes. The initial intent of these single-sex classes, especially at the middle school level was to provide opportunities for students to direct their attention to academic learning rather than socializing and to provide a comfortable environment in which females could gain skills and confidence in the areas of math, science and technology (Sanders, 2002).

In her study of middle school single-sex classes, Margaret Ferrara found substantial differences in the performance and behavior of males and females in single-sex classes. Teachers reported that females learned at a quicker rate and earned higher

academic averages than males. Another teacher reported that females were easier to teach. Males, on the other hand, required continuous engagement in order to realize the benefits of single-sex instruction. On the whole, Ms. Ferrara concluded that in single-sex settings, both males and females were more confident in their efforts, less self-conscious about their work and both sexes participated in class discussion more often (Ferrara, 2005).

There have been several studies undertaken in the last half of the twentieth century concerning physiological/anatomical differences in the brains of males and females which determine a gender specific approach to learning (Fausto, 1999). Proponents of single sex instruction, especially at the middle school level, utilize studies concerning auditory capabilities, vision, genetic programming, endocrinal interactions, replication of tactile activities from instructors and self concept and socialization processes to support their position.

Arguably, the most ardent proponent of single sex classes is the National Association for Single Sex Public Education. While the NASSPE is concerned with classroom distractions and disciplinary issues, their primary concerns are the differences in learning styles of the genders. It is the position of the NASSPE that single sex classes enhance student achievement because this environment allows instructors to address these differences in learning styles. Further, according to Dr. Leonard Sax, MD, PhD, single-sex classes allow females increased opportunities to actively participate in traditionally male dominated courses such as math and science (Sax, 2005).

Supporters of single sex instruction point to the fact that students are regularly segregated on the basis of age. For example, six year old children would not be in the

same classroom as sixteen year old students for the apparent reason that younger children learn using different methodologies (Tannen, 2001).

The counter argument to this contention points to the fact that current research does not support separation of males and females by race. Males and females learn differently regardless of race or culture largely because each sex is genetically hardwired differently at birth (Gurian, 2001). For example, females at birth possess hearing capabilities far more acute than their male counterparts and this particular attribute persists throughout life. Females tend to perform better in quiet classrooms without the high decibel instruction required by males and without the distractions young males often create (Riordan, 1990).

The issue of learning differences between the sexes has also been examined in terms of brain physiology. While one cannot discern the brain of a black female child from that of a white female child, scientists can quickly distinguish the brain of a female child from that of a male child of any race simply by its physical construct (Pakkenberg, Pelvig & Marner, 2003). In other studies, some dating to the 1960s, morphological differences in male and females brains have been encountered, some concerned with learning ability within specific disciplines. For example, in a study conducted at the University of Cincinnati in 1999, Drs. Rabinowicz, Petetot, Gartside, Shetyn and de Courten-Meyers determined that males possess more cerebral neurons that produce increased amounts of neuropil, a chemical required for communication between cells. With the advent of technologically sophisticated imaging equipment, an increasing number of studies are being undertaken to examine physical differences in brain male/female structure which might contribute to understanding learning approaches

utilized by each gender (Rabinowicz, Petetot, Gartside, Sheyn & de Courten-Meyers, 2003).

On the other hand, some researchers insist differences in physical, emotional and intellectual development between the sexes are not linked and thus, biological differences can not explain differences in academic performance. Smith, in his study on learning differences between the sexes, suggests academic performance can be more directly attributable to social and cultural factors such as familiarity with the subject matter, gender perceptions of the subject at hand, teacher expectations and the manner in which the material is presented (Smith, 2004).

A.E. Woolfolk in, *Educational Psychology*, suggests that children and adolescents use gender as a means of organizing, categorizing and understanding their perceptions of their environment and the world in general. Woolfolk supports the contention that gender schema, the theory that society has developed expectations and beliefs about traits associated with males and females, serves as the basis for the perceptions males and females have about their world. Further, gender schema, according to Woolfolk, determines the manner in which information, especially information of a social nature and associated with self esteem, is processed. Because society has developed models of behavior and attitudes for males and females, perceptions, attitudes and behaviors are automatically addressed in a particular, sex-specific manner depending on the sex of the individual (Woolfolk, 1995).

In recent years, researchers have begun to support Woolfolk's position that sex differences have little or no biological basis. Instead, recent research indicates sex

differences are a result of cultural, societal and environment influences (Dreves & Jovanovic (1998).

#### Attitudes, Self-Perception and Academics

Psychologists have long associated learning with self concept and self image and there is research to support the premise that single-sex instruction contributes to creating a positive self image for females in particular (Orenstein & Levin, 1993). Briefly, much of this research demonstrates that females in heterogeneous environments are more concerned with their appearance rather than who they are and base their self concept on their attractiveness. The more attractive they consider themselves, the higher their self esteem regardless of their academic performance (Tannen, 2001).

In their research concerning graduates of single sex schools, Lee and Bryk, both from the University of Michigan, found that graduates of private, sex separated schools tend to demonstrate high academic aspirations, superior academic performance and a more pronounced, positive attitude toward academics and increased confidence in their abilities (Lee & Bryk, 1986).

In 2002, Jackson and Smith undertook a study which focused on the introduction of single-sex instruction in heterogeneous schools. This study sought to highlight the perspectives of single-sex of male and female students concerning single sex instruction. In this study, Jackson and Smith asked seven single sex math students to rate their perceptions of:

1. The most positive and most negative aspects of single-sex classes.
2. Personal achievement.
3. Confidence in single-sex instruction.

4. Differences between the two instructional environments.

The study's results indicated that female only classes had positive effects for female students concerning achievement and confidence in single sex instruction. Regarding males, it was found that single sex classes for males might actually increase problematic male misbehavior if there were not curriculum changes to address learning differences (Jackson & Smith, 2000).

Lesley Parker and Leonie Rennie published their study, Teacher's Implementation of Gender-inclusive Instructional Strategies in Single-Sex and Mixed-Sex Science Classrooms. This study was part of the Single-Sex Education Pilot Project conducted in Western Australia. This study suggests the success of implementing single-sex programs in co-educational environments depends to a large extent on the support the program receives from administrators and the willingness of instructors and instructional support staff to receive necessary training and utilize methodologies designed to exploit the single-sex environment. Further, the study points to the need of parental and community support for the successful implementation single-sex education. The study included ten high schools in rural and urban Western Australia. According to the study, the single-sex environment allowed instructors to remediate some of the apparent shortcomings of males such as poor communication and writing skills and the limited experience of some females with hands-on activities and open-ended problem solving. As a final note, the study indicates much of the sexual harassment and gender bias associated with co-educational environments is eliminated in the single-sex environment (Parker & Rennie, 2002).

### Arguments Supporting Single Sex Instruction

Proponents of single sex instruction assert single-sex classes can minimize gender bias. In 2004, The Canadian Centre for Knowledge Mobilization commissioned a study on single-sex schooling. Terri Thompson and Charles Ungerleider, both from the University of British Columbia, undertook the study in which they reviewed the existing research on single-sex schooling and, after eliminating those articles and studies deemed lacking as legitimate research, reviewed the findings of 48 scholarly articles and 53 newspaper articles. Based upon their review of the research, Thompson and Ungerleider identified several common themes in the research that included:

1. Single-sex schooling benefits certain (typically disadvantaged) students in academic achievement.
2. There are psychological and sociological benefits to females in single-sex classes.
3. When given a choice, females will choose single-sex classes while males will choose heterogeneous classes.
4. Single-sex classes aid in the elimination or reduction of sex-role stereotypes and subject “genderization” whereas heterogeneous classes reinforce them.
5. In general terms, the findings of Thompson and Ungerleider suggest that single-sex environments provide females a certain degree of comfort and engagement due to diminished feelings of intimidation and harassment by males and increased attention from instructors (Thompson & Ungerleider, 2004).

On the island of Tasmania, in a government operated primary school, Richard



Wills, Sue Kilpatrick and Bidy Hutton conducted a study to investigate the social and academic outcomes from single-sex instruction in a co-educational environment.

Through a series of interviews and surveys with parents, teachers and students, the researchers found the primary stakeholders mentioned reported positive benefits from single sex classes but these benefits differed by gender. Faculty and staff identified the following as benefits realized from single-sex instruction:

1. Increased confidence and higher self-esteem among females.
2. Increased motivation and commitment to school responsibilities.
3. Parents and teachers alike noted increased self-discipline and accountability.
4. Teacher efficacy and job satisfaction improved due, in part, to the fact students remained on task longer without interruption or distraction (Wills, Kilpatrick & Hutton, 2006).

Supporters of single sex education suggest students involved favor the separation of the sexes in class for a variety of reasons. According to a study conducted by Frances Spielhagen in a middle school located in the upper Hudson Valley, student attitudes toward single sex instruction was pivotal to the success of the program of single sex instruction. The school had offered single sex classes for three years. Spielhagen interviewed 24 students in the 6<sup>th</sup>, 7<sup>th</sup> and 8<sup>th</sup> grades who had voluntarily taken single sex classes for a year. All three grade level students had remained in heterogeneous non-academic classes and lunch. Spielhagen found that younger students were more likely to find being in single sex classes a more positive experience. However, as students got older, they tended to seek heterogeneous classes. Males were more at ease in single sex classes because they could compete with their peers. Females favored single sex classes

because these classes allowed for increased participation without fear of intimidation or ridicule from males. The author concludes that voluntary single sex classes in public middle school can help create a positive learning environment as well as provide parents and students with additional choices (Spielhagen, 2006).

### Student Behavior

One of the more frequently recurring assertions of supporters of single sex instruction is the relationship between classroom distractions and student achievement. The core issue is their belief that reduced distractions increase time on task and instruction which leads to improved student achievement and some of the research on single sex schools supports this contention. In the heterogeneous classroom, especially at the middle grades level, males and females spend considerable amounts of time attempting to impress each other and often act out in ways detrimental to the learning process. (Vail, 2002).

Vail's position is supported by an article by Caplice in the *Harvard Journal of Law and Public Policy* in 1994. Her article, The Case for Public Single-sex Education, also suggests classroom distractions are the source of many of the problems associated with student performance and achievement. For many in heterogeneous classes, the desire for sexual attractiveness is the prime motivator (Caplice, 1994).

Hughes and Kritsonis propose there are additional benefits other than increased time on task and increased instructional time rendered by separating the sexes in class. In their article in The National Forum of Educational Administration and Supervision, Hughes and Kritsonis point out that improved behavior leads to increased participation by both males and females both of whom tend to thrive in an environment lacking the

presence of the opposite sex. Females, especially, found the participative aspects of the single sex classroom comfortable (Hughes & Kritsonis, 2006).

In another study addressing the relationship between participation and achievement, Streitmatter undertook a study of females taking physics in a heterogeneous setting as well as in a single sex environment. Streitmatter determined from her study that females in the single sex environment demonstrated increased levels of achievement to which, Streitmatter attributed increased participation opportunities. In fact, females in the single sex class attained higher grades than did females in the heterogeneous physics class (Streitmatter, 1999).

#### Student Achievement

There have been numerous studies conducted in England and Australia examining the effects of single sex classes on student academic attainment. In a longitudinal study lasting 18 years and conducted in Australia, Woodward, Fergusson and Horwood investigated the effects of single sex and heterogeneous environments on academic achievement. Their results indicated that single sex schooling for both sexes improved performance especially in increases in scores on reading tests. Further, their results showed greater school retention and less probability of leaving school and being unable to gain employment. The authors also found that even when controlling for abilities of the students, school behavior and family function, students with single sex schooling tended to out-perform those students from heterogeneous environments (Woodward, Fergusson and Horwood, 1999).

In Australia, Carolyn Jackson also examined a series of studies investigating achievement among males and female students in single sex instruction when compared

to students in heterogeneous environments. The primary finding of his work supports the position that instructor quality has a more significant effect on student outcomes than any other school effect. However, Ms. Jackson also found that within a sample of 270,000 students, those students from single sex educational environment (males and females) scored on average 15-22 percentage points higher than their peers in heterogeneous environments on 53 subjects required for the Victorian Certificate of Education (Jackson, 2002).

### Arguments against Single Sex Instruction

Some researchers who support single-sex instruction do so with some reservations. Often these reservations are concerned with the quality of instructors and the willingness of instructors to modify their pedagogical to address learning differences between the sexes. Among the various researchers in the field, there is a consensus that while single-sex classes reduce distractions which consume learning time, it is imperative that the instructor possess a willingness to teach single-sex classes, is committed to maximizing this instructional approach and a willingness to employ innovative teaching techniques that address learning differences (Younger & Warrington, 2005).

The importance of instructor and overall school support for implementing single-sex classes was examined by Carolyn Jackson. In 2002, in the *British Educational Research Journal*, Jackson reported in her article, Can Single-sex Classes in Co-educational Schools Enhance the Learning Experiences of Girls and/or Boys: An Exploration of Pupil's Perceptions, that introducing single sex classes into heterogeneous environment has been considered a primary means of increasing achievement levels of males. Jackson's study concludes that while single sex classes produce substantial

benefits for females, the influence is less in a heterogeneous environment in which instructional methodologies are not modified to address learning approaches. Further, potential benefits are lost without changes in methodologies because this environment tends to reinforce undesirable male behaviors (Jackson, 2002).

The U.S. Department of Education and the Office of Civil Rights, in 2004 gave notice of public hearings and input on the issue of relaxing Title IX restrictions on single sex classes, and a torrent of negative reactions followed from a variety of sectors. Many opposing the modifications were astonished that the Bush Administration would alter the basics of Title IX, the stalwart of equality for females for over 30 years, without adequate research and consideration (Wahl & Campbell, 1998). David Sadker, long known as proponent of single sex classes, has suggested that the Bush Administration has accepted at face value the positions of those supporting single-sex education without exploring the evidence of its impact on student achievement. Further, Sadker and co-author Karen Zittleman have concluded the Bush Administration's desire to provide the same flexibility to public schools as private schools have enjoyed for decades, is based on the faulty belief that public and private schools are similar in design and function as well as in curriculum and pedagogy. According to Sadker and Zittleman, the two can not be logically compared because of their inherent differences (Sadker & Zittleman, 2004).

Opponents of single-sex classes point out that many single sex classes actually serve as a dumping grounds for students with learning disabilities or students, primarily Black males, possessing long histories of disciplinary infractions. Kenneth Cooper, in the journal *Diverse Issues in Higher Education*, argues that single-sex classes in which this dumping has occurred would devolve from a classroom to a hyper-masculine

environment which would serve to reinforce the very behaviors and attitudes single-sex classes are designed to eliminate or greatly reduce. Many of these classes are single sex by default based upon the type of students in the class which are, frequently, Black youth with learning and behavior problems (Cooper, 2006).

One of the more vocal and active opponents to single sex classes is the American Association of University Women. In 1998, the AAUW published an exhaustive study entitled A Critical Look at Single-Sex Education for Girls. In this study, the Association presented a series of points supporting their contention that single sex classes are not the solution to achievement and disciplinary issues in today's public schools. These points included:

- a.. There is no evidence supporting the notion that single sex education works better for girls than heterogeneous opportunities.
- b. Both genders benefit when the elements of a good education are present including small class size, gender equitable instructors and schools that focus on academics.
- c. While there are indications of some improvement in the performance of females in single sex math classes, there is no similar proof for single sex schools (AAUW, 1998).

The American Civil Liberties Union entered into the debate with notification to the Assistant Secretary for Civil Rights, U.S. Department of Education, of the ACLU's opposition to the Department's modifications to Title IX. The ACLU based their opposition to single sex classes in public schools upon the following issues:

- a. The modifications undermine progress made in gender equity in public education made possible by Title IX.
- b. Despite evident progress, there are still issues of gender inequity.
- c. The modifications proposed violate the Equal Protection Clause
- d. Single sex instruction promotes gender bias.
- e. There is insufficient evidence to support the contention single sex classes increase student achievement and foster improved student behavior in the classroom. (Murphy, 2002).

Women's rights supporters and civil rights groups ardently opposed any relaxation of the Title IX restrictions on single sex instruction the U.S. Department of Education proposed in March, 2002. Their opposition was based primarily upon concern that the modifications supported by the U. S. Department of Education would be regressive in the area of gender equality and would dilute the progress realized from of Title IX in the last thirty five years (Datnow & Hubbard, 2002)

The National Coalition for Women and Girls in Education responded to the proposals of the U.S. Department of Education to relax Title IX restrictions on single sex instruction in a letter to Assistant Secretary of Education, Kenneth Marcus. In their letter to Mr. Marcus, the Coalition based its opposition to single sex education on the following points:

- a. Gender discrimination is still prevalent in public education.
- b. The modifications are unnecessary because there is no evidence to support the position that single sex instruction promotes educational benefits.

- c. The modifications to Title IX ignore established legal standards and encourage sexual stereotyping.
- d. There is no scientific research to support the position that single sex instruction benefits either males or females in regard to student achievement (Rustad & Woods, 2005).

Opponents of single sex instruction quickly point to the California experiment which began in 1997. At that time, Governor Pete Wilson signed into law legislation which established twelve single sex public academies (six male and six female) at the middle and high school levels in six districts in the State. The rationale supporting the creation of these academies was to provide students with more options, choices and a better preparation for real world opportunities (Datnow, Hubbard, & Conchas, 2002).

California became the first state to experiment with single-sex public education in 1996. Six districts opened single-sex academies (both females and males). The study, conducted by Datnow, Hubbard and Woody, covers the three year experiment and involves over 300 interviews. The study also focused on the influence of student socio-economic status, gender equity, the means of implementation of the single-sex programs and the policy implications of single-sex education. The findings include the following:

1. The academies, instead of serving as a means of addressing gender inequities, became a vehicle for meeting the needs of at-risk students and associated problems such as truancy, poverty, violence, geographic isolation and low achievement.
2. The academies were doomed to failure because of problems with implementation that included little or no planning before implementation, unrealistic time lines for



implementation, recruitment of qualified teachers or educating the community concerning the single-sex option to stakeholders.

3. The academies did not admit all students. White, high achieving students were given the option to attend the single-sex academies while low-income, minorities were actually recruited. The actual intent and design of the academies was to expand public education options and not to address gender equity or improve the education of “at risk” students.
4. Few parents sent their children to the academies in order to increase their opportunities to benefit from the special resources the pilot program included such as computers, field trips, small class sizes and special opportunities.
5. While the distribution of resources to male and female academies was equitable, the issue of gender bias was not a priority. Instructors did not change their instructional approaches to address the learning differences between males and females.

The authors of this study concluded that single-sex instruction may well improve the behavior and achievement of some student populations such as “at-risk” students but the research did not indicate that single-sex classes improved the achievement levels of the general population of students (Datnow, Hubbard & Woody, 2001). The primary problem lay in the fact that a vast majority of districts involved did not view the development of single sex academies as a means of addressing gender inequities but, instead, saw these academies as a means of addressing the more typical educational and social problems of low achieving students. While educators at these academies sought to decrease distractions in the classroom and improve self-esteem among males and

females, no evidence emerged supporting the position that single sex instruction accomplished either.

As time progressed, the politics of education became a factor as did the lack of public support for single sex education and as these two factors joined the demise of the single sex academies in California began. Further, reductions in state funding reduced the status of the academies locally (Ferrara, 2005).

Pollard suggests in her work, Single-Sex Education, there are three major problems with single-sex classes and instruction to date. The first problem is concerned with the program objectives when implementing single-sex education. Often, the goals established vary within a system and may be influenced by the local culture, economy or school policy. In other districts, the goals of creating a single-sex school or offering single-sex classes frequently involves confronting problems associated with at risk students. The point, according to Pollard, is that results rendered are often significantly influenced by the established goals. For example, if the objective is to address the needs of disadvantaged students in a specific manner and not to increase student achievement, then it is implausible to use student scores as a measure of the program's success.

The second problem, according to Pollard, lies in the manner in which single-sex instructional programs have been implemented. Some programs involve separated instruction in some classes but not others or incorporating single-sex instruction as part of an after school program. Still other systems establish single-sex classes on a full time basis. While Pollard points out there is not a single model that fits the needs of all systems, implementation should undertaken systematically with established objectives and a plan for achieving these objectives in an organized manner.

Thirdly, Pollard notes that here-to-date much of the research undertaken on the benefits, or lack thereof, of single-sex classes has not been systematic. Further, according to the author, there has been a lack of experimental research to ascertain what, if any, relationship exists between single-sex classes and student achievement (Pollard, 1999).

Additional problems are associated with single-sex instruction, according to detractors of single sex instruction. Among these is the absence of a willingness among instructors to modify their teaching pedagogies to accommodate male/female learning differences. The failure of instructors to modify their instructional approaches to accommodate differences in learning styles between males and females dilutes the assertion of supporters of single-sex classes that segregating the sexes allows the instructor to modify instructional approaches that will address these learning differences. In a study published in the *Oxford Review of Education* in 2005, Martino, Mills and Lingard determined that many instructors in single-sex classes did not modify their instructional approaches to address learning differences, and, in fact continued to base their instructional approaches on their preconceived notions of male and female behavior in the classroom (Martino, Lingard & Mills, 2004).

Researchers have examined the methods and interpretations of previous research suggesting that much of the prior research attributes improvements in student performance and increases in self-esteem to family background factors and thus, lessens the effect of the school on student performance and self-esteem. In a 1998 study, Richard Dollison examined the issues of female math performance and self-esteem in a heterogeneous school in which math classes were segregated. He concluded that while

class size and curriculum are important influences in effecting female student achievement and single-sex classes offer an increased locus of control, a sex segregated school environment is not the most critical variable effecting student achievement in adolescent females (Dollison, 1998).

Celeste Dunlap undertook her dissertation study of the perceived gender gap in mathematics between males and females in a fifth grade classroom. The class was organized into two math classes. The objective was to determine if single-sex math classes had any influence on the achievement and attitudes of the female students. The conclusions drawn from this study by Dunlap indicated there was not significant difference in female achievement between single-sex math classrooms and heterogeneous classes in math (Dunlap, 2002).

According to a study undertaken by Harker and published in *The British Journal of the Sociology of Education*, there are gender differences associated with language arts, math and science in which females have higher average academic attainment in a single sex instructional environment. However, when different ability levels and ethnic/social factors in the two types of schools were controlled for, the initial significant difference between achievement levels for girls in single sex environments versus those females in a heterogeneous environment were not significant. Harker concluded that his data did not support the position that females will perform better academically in a single sex environment (Harker, 2000).

### Summary

A review of the literature indicates stakeholders are concerned with a variety of issues associated with single-sex instruction. On one hand, proponents of single-sex

instruction assert that segregated classes, especially at the middle schools level, will make the necessary adjustments to the gender gap presumably existing between males and females in math and science. Their position is based upon the contention that single-sex classes will allow instructors to accommodate perceived learning differences between males and females through pedagogical modifications.

Supporters of single-sex instruction, especially at the middle school level, suggest that separating males and females will reduce classroom disruptions, a majority of which is generally attributable to males, thereby increasing time on task rather than time on classroom management. A final benefit, according to supporters of single-sex instruction, is the assertion that females are more willing to ask questions, answer questions and increase participation in classes without the presence of males, especially in math and science, those content areas in which males traditionally dominate in coeducational classrooms. This environment, according to supporters of single-sex instruction, is conducive to improved student achievement for both males and females.

In regard to males in the single-sex classroom, supporters suggest this environment is more manageable because males tend to act out less when surrounded by other males. With females absent from the classroom, males have no one, other than other males, to attempt to impress. Finally, according to supporters of single-sex instruction, all male classrooms allow instructors to modify their instructional approaches to address the manner in which males learn. This environment, according to proponents, also allows males the opportunity for increased participation in classes such as art, language arts and foreign languages without fear of embarrassment from other males and females, a problem often associated with heterogeneous classes in those content areas.

Opponents of single-sex instruction have also produced a number of reasons to justify their position. The American Association of University Women has repeatedly stated that single-sex instruction does not accomplish any objective that a well planned heterogeneous plan could not accomplish. Such a plan would include smaller teacher-to-student ratios, innovative instructional techniques and the elimination of stereotype threat, especially directed toward females. Further, the AAUW asserts that single-sex instruction would reinvigorate gender bias and stereotyping and repeal much of the progress against sex discrimination realized from Title IX. According to the AAUW, the ACLU and various researchers, there is little evidence, positive or negative, of the impact of single-sex instruction upon which to based modifications to Title IX providing for single-sex instruction.

In sum, there are increasing studies concerning single sex classes in public education and additional information is needed, especially at the middle school level, in order to acquire an acceptable level of understanding of the effects of single sex instruction. Middle school students are at a critical juncture in their personal and intellectual development. There is evidence to support the belief that middle school students are not attaining an operational level of education sufficient to prepare them for the expanded academic expectations they will confront at the high school level. Professional educators and interested groups have an obligation to students, parents and society to examine these problems and potential solutions. It may well be that single-sex instruction can provide some practical contribution in increasing student achievement and behavior but considerable additional research is required to adequately discern the actual influence and impact on student achievement and behavior. However, it should be noted

that regardless of the type of influence single-sex instruction has on student achievement and behavior, single-sex instruction will not serve as the end-all solution to the many and varied issues associated with student achievement.

### CHAPTER III

#### METHODOLOGY

Title IX is one of several provisions included in the Educational Amendments of 1972 signed into law by President Nixon (Educational Amendments, 1972). The provision protected against sexual discrimination in educational programs or activities receiving federal funding (Carpenter & Acosta, 2005). Until Title IX, the use of single sex instruction in public education was practiced and while Title IX did not specifically mandate the discontinuance of single sex instruction, the practice was considered by many as discriminatory and, therefore, nonaligned with the objectives of Title IX. However, the provision did extend the opportunity for public education to use single sex instruction if the school or institution provided comparable facilities and access to athletics and academic programs to the under-represented sex. This option was not viable to most school systems and post-secondary institutions already confronting funding issues (Simon, 2004).

Over the next thirty five years, Title IX legislation would be interpreted so as to constrain the use of single sex instruction in public education. As a result, research addressing the influence of single sex classes on student achievement in public education has been limited. However, the situation changed in 2002 when the Bush administration announced its intention to relax restrictions on single sex instruction as part of their educational policy, No Child Left Behind (NCLB, 2001).

Since 2002, increasing numbers of public schools across the nation have adopted single sex instruction as an additional tool in their efforts to increase student achievement and improve student behavior. In spite of this increase in the number of public schools



now offering single sex instruction and while there exist substantial data from private schools employing single sex instruction, there is still limited data from the public education arena addressing the influence of single sex instruction on student achievement and behavior.

This study examined the influence of the classroom environment, heterogeneous or single sex, exerts on student achievement in math, reading and language arts, as measured by the CRCT, at the sixth grade level at two middle schools. The sixth grade was selected for this study because middle school is considered a pivotal period in the personal development of students. Early adolescence is accompanied by a series of psychological, intellectual and physical changes which directly impact attitudes and performance in school (McAdoo,1999).

Also, this study is concerned with the extent to which student behavior is affected by the classroom environment at sixth grade level at these two middle schools. Research and experience demonstrate that both males and females, undergoing significant hormonal and physical changes, are prone to behaviors designed to impress members of the opposite sex, behaviors which are often disruptive in the classroom thereby inhibiting the learning process. One of the primary contentions of supporters of single sex instruction is that separating the sexes mitigates some of the negative behaviors associated with early adolescence (Sax, 2005). Detractors of single sex instruction suggest this undesirable behavior can be mitigated through the use of competent instructors and lower student to teacher ratios (AAUW, 1998).

This study examined only the influence of single sex classrooms on student achievement and behavior. However, there may have been factors influencing these two domains which were not considered in this study.

### Sections of Chapter III

Chapter three is composed of several sections which examine the manner in which the study was conducted. This portion of the study provides information concerning the methods used to construct the study and analyze the data gathered. The first three sections of the chapter three include the research design which indicates the research model used to acquire, analyze and draw conclusions of the data, the population, that segment of society to which the study is directed and the participants who are the individuals which comprise the population.

Section two of this chapter is concerned with the sample and data collection methods used for this study. The sample used in this study consists of a portion of the overall population chosen as participants. The data collection process describes the manner in which the information and data resulting from the study was accumulated.

The third component of chapter three involves the process of data analysis and the steps in reporting the findings based upon the analysis of the data. The response rate provides the number of participants who provided information on surveys, interviews or other instruments used in the study out of the total of all participants. The data analysis section explains the process by which the data is interpreted and the statistical formulas or tests used to determine if the results of the analysis are significant. The final portion of this third component of chapter three is concerned with the manner in which the analysis

and results of the data is reported. Reporting the data involves representing the findings of the study with tables, graphs, text or graphics or a combination of these methods.

The final section of chapter three addresses the summary of the findings as well as an item analysis. The summary provides a culmination of the data collection process and the analysis of this data in summative form. The item analysis contains the primary points of the quantitative and qualitative sections of the study, the literature to support its inclusion in the study as well as the research question addressed.

## Section I

### *Research Design*

This study is based upon a case study model using quantitative research methods. The quantitative research model utilizes empirical data. Quantitative research employs a systematic examination of the relationship between quantitative entities and phenomena. Quantitative research is founded upon the process of measurement because the measurement process establishes the basic connection between empirical observation and the mathematical expression of this fundamental connection or relationship. The case study is a detailed, intensive study of a unit or group of society and has often been associated with medical, psychological and social phenomenon (Stake, 1995). In the mixed model case study design, quantitative data is derived from the use of the deductive scientific method and involves the accumulation of measurable information, data that is usually quantified numerically ((Greene & Caracelli, 1997).

In scientifically based studies, there are elements of cause and effect. Those actions or events which are manipulated to generate a response are referred to as independent variables. The independent variable serves as the cause of an action or event

and the dependent variable provides the consequence to these actions or events` (Rosenthal & Rosnow, 1991). In this study, the independent variables are classroom environments, single sex and heterogeneous classes at the sixth grade level. Students were separated by sex in sixth grade math, reading and language arts classes (independent variable-classroom environment) and another independent variable, heterogeneous classrooms.

The quantitative research design was selected because the researcher had access to CRCT testing data for two middle schools in Southeast Georgia involved in single sex instruction at the sixth grade level in math, reading and language arts. Further, these same two schools provide CRCT testing data for heterogeneous sixth grade classes in the same three content domains for two years prior to the implementation of single sex instruction. It should be noted that the selection of math, reading and language arts in this study was made because neither of the middle schools used in this study tested for sixth grade science and social sciences on their CRCT during the two year period of heterogeneous classes (2002-2003 and 2003-2004).

The case study is a representation of an environment or event (Yin, 2002). In this study, the environment has three components. The first component is the single sex classroom at the sixth grade level in math, reading and language arts involving two schools for school years 2004-2005 and 2005-2006. The second environmental component involves heterogeneous classes in math, reading and language arts for two years prior to the implementation of single sex instruction in these content areas (2002-2003 and 2003-2004). The third component of the study involves the frequency of disciplinary referrals among heterogeneous and single sex sixth grade classes in math,

reading and language arts and single sex classes in math, reading and language arts classes.

The CRCT testing scores obtained from the Georgia Department of Education for two middle schools in southeast Georgia served as the basis of for the quantitative analysis of this study. The CRCT is a criterion referenced examination which measures the extent to which students learn, acquire or accomplish knowledge or skills within a certain curriculum or set of specific educational standards. The CRCT is administered in the spring of each school year (Georgia Dept. of Education, 2008).

The data in this study include CRCT scores in heterogeneous math, reading and language arts from the school years 2002-2003 and 2003-2004 from ABC Middle School as well as XYZ Middle School, both located in southeast Georgia. The CRCT test data are provided by the Georgia Department of Education. During these school years, 2002-2003 and 2003-2004, both middle schools offered heterogeneous classes in math, reading and language arts. The Georgia Department of Education also provided CRCT test scores for the same schools for the school years 2004-2005 and 2005-2006 during which time both schools offered only single sex instruction at sixth grade level in math, reading and language arts.

In order to ascertain the influence, if any, of the classroom environment on student behavior at the sixth grade level, both middle schools provided data concerning the frequency of disciplinary referrals in sixth grade for the school years 2002-2003 and 2003-2004 during which time both schools offered heterogeneous classes in math, reading and language arts. For purposes of comparison, the disciplinary referrals from both schools were obtained for the school years 2004-2005 and 2005-2006 during which

time both middle schools offered only single sex instruction in math, reading and language arts at sixth grade.

A disciplinary referral is a report of a classroom incident written usually by the instructor in which the student involved is sent to the administrative offices for punitive measures generally more severe than those administered by the classroom instructor. Actual referrals of this nature usually involve student behavior which is disruptive to the class. These referrals detail the specifics of the incident, the pupil involved and the action taken by administrative personnel. As a matter of practice, school systems often maintain a database on a per year basis of these disciplinary referrals which are disaggregated by sex, grade and type of infraction. This study is concerned with and utilizes portions of those aggregated data.

#### Population

The term population, as used in this study, represents those people or entities to which findings of the study are to be generalized and from which samples are taken for inquiry (Stevens, 1993). The population for this study includes all sixth grade students involved in single sex and heterogeneous instruction in math, reading and language arts. The sixth grade was selected because of the transitional nature of that emergent adolescent age group (Ecker, 2002).

Educators have long recognized the significance of the middle school period as a time of considerable individual development, a time in which individuals experience physical, emotional and psychological changes and at a pace more rapid than at any time prior. The various emotional, psychological and intellectual needs of these students are unique to this age group and not generally shared by students at the elementary or high

school level (Steinberg, 1993). During the middle grades, it is important for students to experience success in their endeavors thus providing a foundation for continued development and the reinforcement of self esteem. However, it is also important that middle school students be allowed to make individual choices for which they must assume responsibility. Further, during this period, students are faced with the serious challenges of standardized testing as well as increasing demands to demonstrate academic proficiency (Ecker, 2002).

For males and females in the sixth grade, the classroom represents more than academics. At this point in their development, physical attractiveness is important to both sexes and attempts are made by each sex to attract the other. During times of stress in this heterogeneous environment, both sexes may resort to immature behavior (Brownlee, 1999).

It is this behavior in middle schools that has generated increasing interest in single sex instruction. Many educators familiar with middle school operations suggest that separating males from females in middle school will greatly reduce classroom disruptions by eliminating the source of their distractions. By effectively reducing these disruptions, class time can be more effectively used for instruction rather than classroom management (O'Reilly, 2000).

### Participants

The participants of this study include sixth grade male and female students enrolled in heterogeneous math, reading and language arts classes at ABC Middle School in the school years 2002-2003 and 2003-2004. Additionally, this study includes sixth grade male and female students at XYZ Middle School in heterogeneous math, reading

and language arts classes for the school years 2002-2003 and 2003-2004. During these school years 2002-2003 and 2003-2004, both schools offered only heterogeneous classes in sixth grade math, reading and language arts.

Additional participants include sixth grade students in single sex math, reading and language arts classes for the school years 2004-2005 and 2005-2006 at ABC Middle School and XYZ Middle School. Other participants include the instructors in sixth grade single sex math, reading and language arts classes at both ABC Middle School as well as sixth grade single sex instructors in math, reading and language arts at XYZ Middle School. Finally, on-site administrators at both middle schools responsible for the supervision of the single sex instructional program at sixth grade also serve as participants in this study.

The selection of ABC Middle School and XYZ Middle School was based, in part, upon the fact that both middle schools had utilized heterogeneous classes in math, reading and language arts at the sixth grade level and had done so for a period of over two years prior to changing to single sex classes in these subject areas.

Further, both ABC Middle School and XYZ Middle School had implemented single sex instruction at the sixth grade level in math, reading and language arts for a period of two years which provides testing data for statistical comparison between CRCT scores for two years of heterogeneous sixth grade classes in math, reading and language arts (2002-2003 and 2003-2004) to the CRCT test scores of students involved in single sex sixth grade math, reading and language arts classes for a two year period, 2004-2005 and 2005-2006 from both schools.



As a matter of additional information, both schools during the school years of 2002-2003 and 2003-2004 offered heterogeneous classes not only in math, reading and language arts but also in science and social studies. Further, in the school years 2004-2005 and 2005-2006, both schools offered single sex classes not only in math, reading and language arts but also in social studies and science. However, while both schools tested for all five content areas during 2004-2005 and 2005-2006, neither school tested on the CRCT for science and social studies in 2002-2003 and 2003-2004 so there were no test scores in science and social studies to use for comparison to CRCT scores in school years 2003-2004 and 2004-2005.

Another favorable attribute of the selected middle schools was the accessibility of the CRCT testing data for each school and for the years of interest. These data available via the Georgia Department of Education. Additionally, the principals of both schools indicated their willingness to provide access to faculty and administrators involved in their single sex instructional program. Finally, each school possessed in their databases and provided access to the aggregate totals of disciplinary referrals by sex and frequency for the grade level and schools years targeted in this study.

The students participating in this study and whose CRCT scores provide the basis for much of this research were members of an overall middle school population. For the purposes of this study, the individual student identification and CRCT testing scores are not required. Instead of statistically comparing individual testing results for these sixth grade students in math, reading and language arts, the study utilizes the aggregate scores of the six grade classes by sex and content domain (math, reading and language arts).

Also, in regard to disciplinary referrals for both the heterogeneous and single sex classes, the data was examined as an aggregate and not on the basis of individual infractions.

## Section II

### *Sampling*

Sampling, as it is used in this study, is defined as the process of selecting of participants for study from the larger group to which they belong, also referred to as the population group (Brown, Cozby, Kee & Worden, 1999). The population for this study consisted of all middle schools in the State of Georgia that offered single sex instruction in math, reading and language arts in sixth grade during the school years 2004-2005 and 2005-2006. Further, the population for this study included all middle schools in Georgia which offered heterogeneous classes in sixth grade in math, reading and language arts for the school years 2002-2003 and 2003-2004.

The student sample for this study is derived from the existing student population at ABC Middle School and XYZ County Middle School, both located in southeast Georgia.

The student population at ABC Middle School for the sixth grade heterogeneous math, reading and language arts classes for the school years 2002-2003 was composed of 124 females and 108 males. For the school year 2003-2004, ABC Middle School had 99 females and 115 males enrolled in heterogeneous sixth grade math, reading and language arts.

ABC Middle School counted among its sixth grade single sex classes in math, reading and language arts 108 females and 115 males in the school year 2004-2005 and the school year 2005-2006, there were 91 females and 98 males participating in single sex math, reading and language arts classes in sixth grade.

During the school year 2002-2003, records for XYZ Middle School indicate 138 females and 144 males attended sixth grade heterogeneous math, reading and language arts classes and in the subsequent school year of 2003-2004, there were 139 females and 151 males in attendance in sixth grade heterogeneous math, reading and language arts.

XYZ Middle School, in the school year of 2004-2005, reported 139 females and 143 males were enrolled in single sex math, reading and language art classes at sixth grade. For school year 2005-2006, the school had 162 females and 172 males attending single sex sixth grade math, reading and language arts classes.

The two middle schools serving as the basis of this study employed assessments based upon criterion sampling. Criterion sampling involves the direct selection of participants for study based upon their association with clearly identifiable criterion. Criterion sampling is often employed when the population is unique (Patton, 1990). In this study the specific criterion for selection included:

1. Each of the two schools selected had offered heterogeneous classes at the sixth grade level in math, reading and language arts for a period of two years prior to implementation of single sex instruction in sixth grade math, reading and language arts (2002-2003 and 2003-2004).
2. Each of the two selected schools had undertaken the CRCT in sixth grade heterogeneous classes in math, reading and language arts for two years (2002-2003 and 2003-2004) prior to the implementation of single sex instruction at sixth grade in math, reading and language arts.

3. Each of the selected schools had implemented single sex instruction in sixth grade math, reading and language arts classes for a period of two years (2004-2005 and 2005-2006).
4. Each of the two selected schools had administered the CRCT in their sixth grade single sex classes in math, reading and language arts for a period of two years (2004-2005 and 2005-2006).
5. The schools selected for this study possessed within their respective databases, disciplinary referrals issued for the sixth grade during the two years of heterogeneous classes in math, reading and language arts (2002-2003 and 2003-2004) preceding the implementation of single sex instruction in sixth grade math, reading and language arts.
6. Each middle schools possessed data detailing disciplinary referrals issued in sixth grade single sex classes in math, reading and language arts for a period of two years (2004-2005 and 2005-2006).
7. Administrators at both middle schools selected for this study agreed to allow members of their staff, including the supervising administrators involved in single sex instruction in sixth grade to complete a survey addressing their sentiments and observations of the single sex instructional program.

The rationale for selecting the criterion was twofold. The CRCT scores for two years of heterogeneous, sixth grade classes in math, reading and language arts served as a standard by which to compare the two year CRCT scores of sixth grade classes in single sex math, reading and language arts at each school.

Secondly, in order to ascertain the effect of classroom environment on student behaviors at the sixth grade level, information contained in the disciplinary reports from each school is required. This information includes the sex of the offender and the frequency of referrals for both sixth grade heterogeneous math, reading and language arts classes (2002-2003 and 2003-2004) as well as the same information for the sixth grade single sex classes in math, reading and language arts (2004-2005 and 2005-2006) for both middle schools. With this information, a comparison of disciplinary referrals can be made between heterogeneous, sixth grade math, reading and language arts classes and the disciplinary referrals associated with the sixth grade single sex classes in math, reading and language arts at each individual schools.

In order to assess the influence, if any, of classroom environment on student behavior, the accessibility of disciplinary referrals, by sex and frequency for the two years of heterogeneous math, reading and language arts classes is essential for comparison to the sex and frequency of disciplinary referrals from two years of single sex sixth grade classes in math, reading and language arts.

#### Data Collection

The quantitative foundation of this study is concerned with aggregate percentages of student performance on the CRCT in sixth grade math, reading and language arts by sex and classroom environment instead of CRCT scores of individual students in those content domains. These data are processed and maintained by the Georgia Department of Education. These percentages reflect the number of students, both male and female, in the sixth grade at ABC Middle School and XYZ Middle School

that placed, by their scores, in one of three scoring criteria approved by the State of Georgia and include the following standards:

1. The student does not meet minimum standards.
2. The student meets minimum standards.
3. The student exceeds minimum standards (Georgia Dept. of Education, 2008).

This study compares the CRCT scores of heterogeneous students in sixth grade math, reading and language arts classes for the school years 2002-2003 and 2003-2004 with CRCT scores for male and female students enrolled in sixth grade single sex math, reading and language arts classes in the school years 2004-2005 and 2005-2006 at both middle schools,

With these comparisons of CRCT scores in single sex and heterogeneous classes in math, reading and language arts for each of the schools, the number of sixth grade students attaining one of the three performance levels can be ascertained according to sex and classroom environment. This additional disaggregation of the data provides the basis for further examination to determine trends or relationships between sex, classroom environment and the levels of student performance on the CRCT in the three content domains as measured by the criteria approved by the State of Georgia.

#### Data Disaggregation

Thus, the quantitative portion of this study is divided into two primary groups and their sub-groups from each of the selected middle schools, ABC Middle School and XYZ Middle School. Primary Groups ABC-H (ABC Middle School) and XYZ-H (XYZ Middle School) contain students at the sixth grade level enrolled in heterogeneous math,

reading and language arts classes for a period of two years (2002-2003 and 2003-2004).

The second set of groups, Primary Groups ABC-SS and XYZ-

SS, consists of sixth grade male and female students participating in single sex classes in math, reading and language arts for two years (2004-2005 and 2005-2006).

Primary Groups ABC & XYZ (ABC Middle School and XYZ Middle School) are divided into sub-groups based upon testing, sex and classroom environment and includes the following:

Sub-Group-1-Math (heterogeneous, sixth grade classes 2002-2003 and 2003-2004 at ABC and XYZ Middle Schools):

1. Male and female students who scored at the “does not meet standards” level of the CRCT in math.
2. Male and female students who attained the score of “meets standards” in math on the CRCT.
3. Male and female students who scored at the “exceeds” performance level in math on the CTCT.

Sub-Group-2-Reading (heterogeneous sixth grade classes, 2002-2003 and 2003-2004 at ABC and XYZ Middle Schools):

1. Male and female students who did not score at the minimum performance level (does not meet) in reading on the CRCT in the school year 2002-2003).
2. Male and female students who scored at the minimum acceptable level (meets standards) on the reading test of the CRCT in 2002-2003.
3. Male and female students who exceeded minimum standards in the reading section of the CRCT.

Sub-Group-3-Language Arts (heterogeneous sixth grade classes 2002-2003 and 2003-2004 at ABC and XYZ Middle Schools).

1. Male and female students who failed to meet the minimum standards (does not meet) in the language arts portion of the CRCT.
2. Male and female students who succeeded in attaining meeting the minimum proficiency requirement (meets standards) on the language arts section of the CRCT.
3. Male and female students who exceeded the minimum acceptable level of performance on the language arts section of the CRCT.

Primary Groups ABC/XYZ-SS is divided into sub-groups based upon sex, content area tested and classroom environment and is composed of the following:

Sub-Group ABC/XYZ-SS-Math (single sex sixth grade classes in math in 2004-2005 and 2005-2006 at ABC/XYZ Middle Schools).

1. Males and females undertaking the math portion of the CRCT that failed to meet minimum standards (does not meet).
2. Males and females that met minimum standards (meets standards) on the math section of the CRCT.
3. Males and females that surpassed the minimum acceptable performance level (exceeds) on the CRCT in math.

Sub-Group ABC/XYZ-SS-Reading (single sex sixth grade classes in reading in 2004-2005 and 2005-2006 at ABC and XYZ Middle Schools).

1. Males and females not attaining (does not meet) the minimum score in reading as measured by the CRCT.



2. Males and females who successfully scored (meets standards) at the minimum satisfactory level in reading on the CRCT.
3. Males and females who scored beyond (exceeds standards) the minimum required performance level in reading on the CRCT.

Sub-Group ABC/XYZ-SS-Language Arts (single sex sixth grade classes in language arts in 2004-2005 and 2005-2006).

1. Males and females who did not meet the minimum successful performance criteria in language arts on the CRCT (does not meet).
2. Males and females undertaking the language arts portion of the CRCT who attained the minimum performance level (meets standards).
3. Males and females who excelled (exceeded standards) in the language arts section of the CRCT.

The CRCT scores of males and females in sixth grade heterogeneous classes for school years 2002-2003 and 2003-2004 were compared based on sex, testing sections of the CRCT and classroom environment. The comparison is based upon the following:

ABC Middle School and XYZ Middle School (2002-2003 compared to 2004-2005):

1. CRCT math scores for males and females in heterogeneous math classes for school year 2002-2003 compared to CRCT math scores of males and females in single sex math class in 2004-2005 based upon scoring criteria approved by the State of Georgia (does not meet, meet standards and exceeds standards).
2. CRCT scores on reading section for males and females in heterogeneous reading classes for school year 2002-2003 compared to CRCT reading scores

of males and females in single sex reading classes in 2004-2005 based upon scoring criteria approved by the State of Georgia (does not meet, meet standards and exceeds standards).

3. CRCT scores in the language arts section of the test for males and females in heterogeneous language arts classes for school year 2002-2003 compared to CRCT language arts scores of males and females in single sex reading classes in 2004-2005 based upon scoring criteria approved by the State of Georgia (does not meet, meet standards and exceeds standards).

ABC Middle School and XYZ Middle School (2003-2004 compared to 2005-2006):

1. CRCT scores in the math section of the test for males and females in heterogeneous math classes for school year 2003-2004 compared to CRCT math scores of males and females in single sex math classes in 2005-2006 based upon scoring criteria approved by the State of Georgia (does not meet, meet standards and exceeds standards).
2. CRCT reading scores for males and females in heterogeneous reading classes for school year 2003-2004 compared to CRCT reading scores of males and females in single sex reading classes in 2005-2006 based upon scoring criteria approved by the State of Georgia (does not meet, meet standards and exceeds standards).
4. CRCT scores in language arts for males and females in heterogeneous language arts classes for school year 2003-2004 compared to CRCT scores on the language arts portion of the CRCT for males and females in single sex

reading classes in 2005-2006 based upon scoring criteria approved by the State of Georgia (does not meet, meet standards and exceeds standards).

### Disciplinary Referrals

The number of disciplinary referrals for sixth grade classes at both middle schools were obtained from the local board of education and included school years 2002-2003 and 2003-2004 during which both schools maintained heterogeneous classes in math, reading and language arts and school years 2004-2005 and 2005-2006 during which time both schools provided single sex classes in math reading and language arts at sixth grade. These disciplinary referrals were sub-divided as follows:

1. Disciplinary referrals for sixth grade males during school years 2002-2003 and 2003-2004 (heterogeneous).
2. Disciplinary referrals for sixth grade females during school years 2002-2003 and 2003-2004 (heterogeneous).
3. Disciplinary referrals for sixth grade males during school years 2004-2005 and 2005-2006 (single sex).
4. Disciplinary referrals for sixth grade females during school years 2004-2005 and 2005-2006 (single sex).

The quantity of disciplinary referrals for sixth grade males and females at ABC Middle School accumulated during school year 2002-2003 (heterogeneous) were compared to the quantity of disciplinary referrals for sixth grade males and females in school year 2004-2005 (single sex). Further, the disciplinary referrals for sixth grade males and females for school years 2003-2004 (heterogeneous) were compared to the disciplinary referrals for sixth grade males and females for the school year 2005-2006 in

order to determine if there was a significant difference rendered by differences in classroom environment.

### Section III

#### *Data Analysis*

The t-test assesses whether the means of two groups, heterogeneous and single sex are statistically different from each other (Sprinthall, 2003). This analysis is appropriate when comparing the means of two groups and in this study, CRCT scores from two middle schools involving sixth grade students in math, reading and language arts from both heterogeneous and single sex classes for a period of two years serve as the basis of the quantitative section. Further, in this study, the quantity of disciplinary referrals from both heterogeneous and single sex sixth grade classes are also analyzed using the t-test.

Regarding the issue of significance in differences realized in the comparison of the CRCT scores between heterogeneous and single sex classes in sixth grade math, reading and language arts, the standard of significance for this study is ten percent plus or minus. Thus, a ten percent increase or decrease in the comparison of CRCT scores in one or all of the content areas tested, sixth grade math, reading and language arts will be regarded as significant for the purposes of this study. Concerning the comparison of disciplinary referrals between heterogeneous and single sex sixth grade classes, a ten percent increase or decrease in the frequency of disciplinary referrals will, for the purpose of this study, be considered significant.

## Data Representation

The data derived from the data analysis are presented with the primary use of tables and text. These tables, with text, serve to present the data accumulated in clear and understandable terms. These tables represent the comparison of CRCT scores in sixth grade math, reading and language arts between heterogeneous and single sex classes as individual content and testing areas based upon classroom environment and sex. These tables also afford the opportunity to demonstrate, using data provided by the State of Georgia, differences in CRCT scores between heterogeneous and single sex classes by sex and content area (math, reading and language arts). Additionally, tables and text are used to represent the statistical analysis of disciplinary referrals among sixth grade students in both heterogeneous and single sex classes. The qualitative data obtained from the instructor and administrator's surveys was coded and the results of this coding are presented using tables and text.

## Summary

This study was based upon a case study design using quantitative research methods. The objective of this study was concerned with the comparison of CRCT scores, from both middle schools, of sixth grade heterogeneous math, reading and language arts classes for the school years 2002-2003 and 2003-2004 to those CRCT scores for single sex sixth grade classes in math, reading and language arts for school years 2004-2005 and 2005-2006. This comparison was used to determine the extent of influence, if any, the classroom environment had on student achievement as measured by the CRCT. The second objective of this study was to determine the extent of influence, if any, the classroom environment, heterogeneous or single sex, had on student classroom

behavior as measured by disciplinary referrals. In order to ascertain the degree of influence the classroom environment exerted on student behaviors, the quantity of disciplinary referrals for sixth grade heterogeneous classes in math, reading and language arts for school year 2002-2003 and 2003-2004 were compared to the quantity of disciplinary referrals from sixth grade single sex classes in math, reading and language arts for school years 2004-2005 and 2005-2006 from each of the two middle schools.

## CHAPTER IV

### RESULTS

The purpose of this study was to examine the influence, if any, that single sex instruction had upon student achievement and behavior at the sixth grade level at two middle schools. The methodology used in this study was based upon a quantitative research design.

#### Research Design

The quantitative data in this study were obtained from the Georgia Department of Education and utilizes data from two middle schools in southeast Georgia. The Georgia Department of Education provided CRCT testing scores for sixth grade students in heterogeneous math, reading and language arts classes for the school years 2002-2003 and 2003-2004. Additionally, CRCT testing scores were obtained for sixth grade students in single sex classes in math, reading and language arts classes for the school years 2004-2005 and 2005-2006 for both middle schools. The final component of this study included the frequency of disciplinary referrals of sixth grade students in heterogeneous math, reading and language arts classes for school years 2002-2003 and 2003-2004. The disciplinary referrals from sixth grade students in single sex math, reading and language arts classes for the school years 2004-2005 and 2005-2006 were also obtained for both middle schools. The CRCT scores for both classroom environments were compared for each middle school in order to determine the existence of any significant differences in CRCT scores and the quantity of disciplinary referrals produced by the classroom environment.

## Research Questions

Two research questions provided the foundation for this study. These questions are as follows:

1. Does student achievement in math, reading and language arts, as measured by the CRCT, in either of the two selected middle schools vary by enrollment in single sex/heterogeneous settings?
2. Is there a difference in the frequency of student disciplinary referrals in single sex versus heterogeneous sixth grade classroom environment?

Supporters of single sex instruction have based their support on the contention that if sixth grade males and females are separated, increased time would be spent on task and content, females would increase their participation in traditionally male dominated courses such as math and science and males would come to appreciate languages and arts and, thus, improve their performance in traditionally female dominated courses.

Additionally, separating the sexes would reduce classroom disruptions and the quantity of disciplinary referrals. Accordingly, this study examined these contentions with the comparison of CRCT scores in math, reading and language arts between two years of heterogeneous sixth grade classes and two years of single sex classes as well as the frequency of disciplinary referrals during those timeframes at each of the two middle schools.

## Findings

The findings that follow regarding scores on standardized assessments resulted from data provided by the State of Georgia and was evaluated by combining the actual scores of students on the CRCT by sex, grade level, content testing and score results for a



two year period during which heterogeneous classes were offered at each middle school and compared by statistical analysis to the combined (two years) CRCT scores of male and female students enrolled in single sex classes in the same content areas of math, reading and language arts.

*ABC Middle School*

*Finding # 1-Reading-Males*

In the school years 2002-2003 and 2003-2004 at ABC Middle School, there were 223 males from sixth grade heterogeneous reading classes tested using the CRCT, a criterion reference test that measures the retention of certain facts and/or information as determined by a specific set of content parameters. Of these 223 male students in heterogeneous reading classes, 57 failed to meet the minimum performance standards while 86 males in the same reading classes performed at the minimum required level. Another 80 male students in heterogeneous reading classes exceeded the minimum acceptable level of performance.

At the same school for the school years 2004-2005 and 2005-2006, a total of 213 males in single sex sixth grade classes were tested in reading using the CRCT as the assessment instrument. On that particular section of the test, 40 males failed to meet the minimum performance level whereas 111 males in single sex reading classes attained the minimum acceptable performance level. Finally, 62 male students in single sex reading classes exceeded the minimum acceptable performance level. Table 1 displays the results of a t-test to measure for significance in comparing these two conditions.

**Table 1:** Sixth Grade Male CRCT Reading Scores at ABC Middle School for School Years 2002-2003 and 2003-2004 (Heterogeneous) and 2004-2005 and 2005-2006 (Single Sex).

Group One-Heterogeneous 2002-2003 2003-2004		Group Two-Single Sex 2004-2005 2005-2006	
Did Not Meet	57	Did Not Meet	40
Met Requirements	86	Met Requirements	111
Exceeded	80	Exceeded	62

Group	Group One-Heterogeneous	Group Two-Single Sex
Mean	74.33	71.00
SD	15.31	36.35
SEM	8.84	20.98
N	3	3

P-value and statistical significance:

The two-tailed P value equals 0.8907

By conventional criteria, this difference is considered to be not statistically significant.

Confidence interval:

The mean of Group One minus Group Two equals 3.33

95% confidence interval of this difference: From -59.88 to 66.55

### *Discussion*

Table 1 indicates that while there was a decrease in the number of male students from single sex classes who did not attain minimum performance requirements on the reading portion of the CRCT when compared to the number of males in heterogeneous reading classes, the difference is not considered statistically significant. In research question one, the study seeks to determine the extent that student achievement is influenced by the classroom environment, heterogeneous or single sex, at the sixth grade level. Finding # 1 suggests there were no significant differences in scores on the CRCT

reading section between the numbers of sixth grade male students in heterogeneous reading classes and male sixth grade students in single sex reading classes. Thus, in response to research question one there was no apparent difference in student achievement levels in reading between heterogeneous and single sex sixth grade male students.

*ABC Middle School*

*Finding # 2-Language Arts-Males*

School years 2002-2003 and 2003-2004 at ABC Middle School, produced 223 males enrolled in sixth grade heterogeneous language arts classes who undertook the language arts section the CRCT. Of these 223 male students, 90 failed to meet the minimum performance standards established by the State of Georgia while 99 males in the same heterogeneous reading classes performed at the minimum required level. The remaining 34 male students in heterogeneous reading classes exceeded the minimum acceptable level of performance.

At the same school for the school years 2004-2005 and 2005-2006, a total of 213 males in single sex sixth grade language arts classes, were assessed in language arts using the CRCT. On that particular section of the test, 48 males failed to meet the minimum performance level whereas 134 males in single sex language arts classes attained the minimum acceptable performance level. Finally, 31 male students in single sex language arts classes for these two years exceeded the minimum acceptable performance level. Table 2 displays the results of a t-test to measure for significance in comparing these two conditions.

**Table 2:** Sixth Grade Male CRCT Language Arts Scores at ABC Middle School for School Years 2002-2003 and 2003-2004 (Heterogeneous) and 2004-2005 and 2005-2006 (Single Sex).

Group One-Heterogeneous 2002-2003 2003-2004		Group Two-Single Sex 2004-2005 2005-2006	
Did Not Meet	90	Did Not Meet	48
Met Requirements	99	Met Requirements	134
Exceeded	34	Exceeded	31

Group	Group One-Heterogeneous	Group Two-Single Sex
Mean	74.33	71.00
SD	35.22	55.22
SEM	20.33	31.88
N	3	3

P value and statistical significance:

The two-tailed P value equals 0.9340

By conventional criteria, this difference is considered to be not statistically significant.

Confidence interval:

The mean of Group One minus Group Two equals 3.33

95% confidence interval of this difference: From -101.65 to 108.32

### *Discussion*

Table 2 indicates a reduction in the quantity of sixth grade male students from single sex language arts classes who did not attain minimum performance requirements on the reading portion of the CRCT when compared to the number of sixth grade males in heterogeneous language arts classes. Further, there was an increase in the number of males from single sex language arts classes who met the minimum requirements as compared to the number of sixth grade males from heterogeneous classes in language

arts. However, the t-test analysis suggests these differences are not considered statistically significant. In research question one, the study seeks to determine the extent, if any, that student achievement is influenced by the classroom environment, heterogeneous or single sex, at the sixth grade level. Finding # 2 suggests the lack of significant differences in the performances of male sixth grade students from single sex classes on CRCT language arts section and the performance of sixth grade male students in heterogeneous language arts classes as measured by the CRCT.

*ABC Middle School*

*Finding # 3-Math-Males*

ABC Middle School recorded that in school years 2002-2003 and 2003-2004, there were 223 male sixth grade students enrolled in heterogeneous math classes and were tested using the math portion of the CRCT for assessment. Of this total, 63 did not meet the minimum performance level as designated by the State of Georgia whereas 114 sixth grade male students did meet the minimum performance requirement. Finally, 46 male students from heterogeneous math classes exceeded state mandated performance requirements.

School years 2004-2005 and 2005-2006 at ABC Middle School produced 213 sixth grade male students in single sex math classes who were tested in math on the CRCT. Of this total, 57 students failed to meet minimum performance standards on the math section of the CRCT as established by the State of Georgia. Another 114 male students from single sex classes in math met the minimum performance requirements while 42 students exceeded the scoring requirements established by the State of Georgia.

**Table 3:** Sixth Grade Male CRCT Math Scores at ABC Middle School for School Years 2002-2003 and 2003-2004 (Heterogeneous) and 2004-2005 and 2005-2006 (Single Sex).

Group One-Heterogeneous 2002-2003 2003-2004		Group Two-Single Sex 2004-2005 2005-2006	
Did Not Meet	63	Did Not Meet	57
Met Requirements	114	Met Requirements	114
Exceeded	46	Exceeded	42

Group	Group One-Heterogeneous	Group Two-Single Sex
Mean	74.67	71.00
SD	35.23	37.99
SEM	20.34	21.93
N	3	3

P value and statistical significance:

The two-tailed P value equals 0.9084

By conventional criteria, this difference is considered to be not statistically significant.

Confidence interval:

The mean of Group One minus Group Two equals 3.67

95% confidence interval of this difference: From -79.38 to 86.72

### *Discussion*

Table 3 indicates there was a decrease in the number of sixth grade male students from single sex math classes who did not attain minimum performance requirements on the reading portion of the CRCT when compared to the number of males in heterogeneous reading classes. Research question one the study is concerned with the extent, if any, that student achievement is influenced by the classroom environment, heterogeneous or single sex, at the sixth grade level. Finding # 3 suggests there were no

significant differences in student performance on the CRCT reading section between sixth grade male students in heterogeneous reading classes and male sixth grade students in single sex reading classes.

*ABC Middle School*

*Finding # 4-Reading-Females*

School year 2002-2003 and 2003-2004 at ABC Middle School produced 223 females who were enrolled in heterogeneous reading classes in sixth grade. Among these sixth grade females 44 did not attain the minimum performance level as decreed by the State of Georgia on the reading section of the CRCT. Additionally, 81 of these female students from heterogeneous reading classes were able to meet the state's performance requirements. The balance of students, a total of 98, exceeded the minimum score.

Two years later, 2004-2005 and 2005-2006, ABC Middle School registered 199 female students in sixth grade single sex reading classes. After the administration of the CRCT for those school years, the scoring results indicated that 13 students did not meet the minimum level of performance on the reading portion of the CRCT. Of the remaining female students from single sex reading classes, 111 successfully pass the reading section of the CRCT. Finally, the remaining 75 students exceeded the state's mandated minimum performance level.

**Table 4:** Sixth Grade Female CRCT Reading Scores at ABC Middle

School for School Years 2002-2003 and 2003-2004 (Heterogeneous) and  
2004-2005 and 2005-2006(Single Sex).

Group One-Heterogeneous 2003-2004 2004-2005		Group Two-Single Sex 2004-2005 2005-2006	
Did Not Meet	44	Did Not Meet	4
Met Requirements	81	Met Requirements	74
Exceeded	98	Exceeded	13

Group	Group One-Heterogeneous	Group Two-Single Sex
Mean	74.33	66.33
SD	27.61	49.57
SEM	15.94	28.62
N	3	3

P value and statistical significance:

The two-tailed P value equals 0.8191

By conventional criteria, this difference is considered to be not statistically significant.

Confidence interval:

The mean of Group One minus Group Two equals 8.00

95% confidence interval of this difference: From -82.96 to 98.96

### *Discussion*

As Table 4 suggests, there was a sizable decrease among female sixth grade students in single sex reading classes who did not meet the minimum standard of success as mandated by the State of Georgia on the reading section of the CRCT. Female sixth grade students from heterogeneous reading classes generated a total of 44 who did not



meet minimum standards whereas females from single sex sixth grade classes in reading generated four students who did not meet standards. Regarding those female sixth grade students in reading, those students who participated in single sex reading classes almost doubled the number of female sixth grade students in heterogeneous reading classes who met the mandated standards. In contrast, the number of sixth grade female students who exceeded in their scores in reading on the CRCT who participated in heterogeneous reading classes surpassed those who exceeded mandated performance levels in the reading section of the CRCT participating in single sex classes. However, these trends notwithstanding, the t-test analysis suggests that there is no statistical difference between the reading scores of those in sixth grade single sex classes and those of heterogeneous sixth grade reading classes.

*ABC Middle School*

*Findings # 5-Language Arts-Females*

School years 2002-2003 and 2003-2004 at ABC Middle School experienced an enrollment of 223 females from heterogeneous language arts classes who tested on the language arts portion of the CRCT. Of these 223 female students in heterogeneous language arts classes, 54 failed to meet the minimum performance standards while 119 females in the same heterogeneous language arts classes performed at the minimum required level. Another 50 female students in heterogeneous language arts classes exceeded the minimum acceptable level of performance as prescribed by the State of Georgia.

At the same school for the school year 2004-2005, a total of 199 females in single sex classes were tested in language arts using the CRCT as the assessment instrument.

On that particular section of the test, 15 females failed to meet the minimum performance level whereas 133 females in single sex reading classes attained the minimum acceptable performance level. Finally, 51 female students in single sex reading classes exceeded the minimum acceptable performance level. Table 5 displays the results of a t-test to measure for significance in comparing these two conditions.

**Table 5:** Sixth Grade Female CRCT Language Arts Scores at ABC Middle School for School Years 2002-2003 and 2003-2004 (Heterogeneous) and 2004-2005 and 2005-2006 (Single Sex).

Group One-Heterogeneous 2002-2003 2003-2004		Group Two-Single Sex 2004-2005 2005-2006	
Did Not Meet	54	Did Not Meet	15
Met Requirements	119	Met Requirements	133
Exceeded	50	Exceeded	51

Group	Group One-Heterogeneous	Group Two-Single Sex
Mean	74.33	66.33
SD	38.73	60.48
SEM	22.36	34.92
N	3	3

P value and statistical significance:

The two-tailed P value equals 0.8564

By conventional criteria, this difference is considered to be not statistically significant.

Confidence interval:

The mean of Group One minus Group Two equals 8.00

95% confidence interval of this difference: From -107.12 to 123.12

*Discussion*

Table 5 indicates there was a decrease in the number of sixth grade female students from single sex language arts classes who did not attain minimum performance requirements on the reading portion of the CRCT when compared to the number of females in heterogeneous language arts classes. Research question one of the study is concerned with the extent, if any, that student achievement is influenced by the classroom environment, heterogeneous or single sex, at the sixth grade level. Finding # 5 suggests there were no significant differences in student performance on the CRCT language arts section among sixth grade female students in heterogeneous language arts classes and female sixth grade students in single sex language arts classes.

*ABC Middle School**Finding # 6-Math-Females*

The heterogeneous math classes at ABC Middle School in the school years 2002-2003 and 2003-2004 were composed of 223 female students in sixth grade. The results of the CRCT in math indicate that of this total 46 met the State of Georgia's minimum performance requirement. Also of this total, 131 female sixth grade students met the state's requirement and 46 surpassed the minimum scoring requirements.

During the two years, 2004-2005 and 2005-2006, ABC Middle School presented single sex classes in math. There were 199 female students in single sex sixth grade math classes at ABC Middle School during these two years. CRCT results on the math portion of the test demonstrate that 33 female students in sixth grade math class failed to accommodate the minimum performance requirements as established by the State of Georgia. However, 137 of these female students from sixth grade math classes met the

state's minimum requirement. Finally, 27 of these students exceeded the requirements mandated by the state.

**Table 6:** Sixth Grade Female CRCT Math Scores at ABC Middle School for School Years 2002-2003 and 2003-2004 (Heterogeneous) and 2004-2005 and 2005-2006 (Single Sex)

Group One-Heterogeneous 2002-2003 2003-2004		Group Two-Single Sex 2004-2005 2005-2006	
Did Not Meet	46	Did Not Meet	53
Met Requirements	131	Met Requirements	137
Exceeded	46	Exceeded	27

Group	Group One-Heterogeneous	Group Two-Single Sex
Mean	74.33	65.67
SD	49.07	61.85
SEM	28.33	35.71
N	3	3

P value and statistical significance:

The two-tailed P value equals 0.8585

By conventional criteria, this difference is considered to be not statistically significant.

Confidence interval:

The mean of Group One minus Group Two equals 8.67

95% confidence interval of this difference: From -117.89 to 135.23.

### *Discussion*

As suggested by the data, there was a minimum quantifiable difference within all three state mandated criteria among the various classes and schools. As a consequence, the actual differences did not demonstrate a statistical significance among the scores from

heterogeneous sixth grade math classes and those of female single sex sixth grade math classes.

*XYZ Middle School*

*Finding # 7-Reading-Males*

XYZ Middle School experienced an enrollment of 295 males in their sixth grade heterogeneous reading classes for school years 2002-2003 and 2003-2004. On the reading section of the CRCT 59 of these male sixth grade students did not attain the minimum acceptable score. However, there were 132 sixth grade males who did successfully meet the minimum acceptable performance level. There were 104 male sixth grade students from heterogeneous classes who surpassed the acceptable performance standard as established by the State of Georgia.

**Table 7:** Sixth Grade Male CRCT Reading Scores at XYZ Middle School for School Years 2002-2003 and 2003-2004 (Heterogeneous) and 2004-2005 and 2005-2006 (Single Sex).

Group One-Heterogeneous 2002-2003 2003-2004		Group Two-Single Sex 2004-2005 2005-2006	
Did Not Meet	59	Did Not Meet	56
Met Requirements	132	Met Requirements	183
Exceeded	104	Exceeded	75

Group	Group One-Heterogeneous	Group Two-Single Sex
Mean	98.33	104.67
SD	36.83	68.50
SEM	21.26	39.55
N	3	3

P value and statistical significance:

The two-tailed P value equals 0.8947

By conventional criteria, this difference is considered to be not statistically significant.

Confidence interval:

The mean of Group One minus Group Two equals -6.33

95% confidence interval of this difference: From -131.00 to 118.34

### *Discussion*

The t-test analysis indicates there is no statistical significance between the CRCT reading scores for sixth grade males from heterogeneous classes and those of sixth grade males from single sex reading classes.

### *XYZ Middle School*

#### *Finding # 8-Language Arts-Males*

The school years of 2002-2003 and 2003-2004 produced a total of 294 males enrolled in heterogeneous language arts classes at the sixth grade level at XYZ Middle School. The results of the CRCT test assessing language arts skills and knowledge demonstrated that 90 of the 294 males in heterogeneous language arts classes did not meet the minimum performance requirement approved by the state. The number of male students from sixth grade heterogeneous language arts classes who met the state's acceptable performance level included 160 of the total of 294. The balance of the total of males in heterogeneous classes, 44, exceeded the state's mandated performance criteria.

During the first two years that XYZ Middle School offered single sex classes at the sixth the grade level, school years 2004-2005 and 2005-2006, there were 314 males registered in single sex language arts classes. Upon taking the CRCT, it was determined that 62 males in single sex language arts classes at sixth grade had not met the minimum state requirements in language arts while another 209 did attain the acceptable performance level. Thirty-three of the total 314 male students in single sex language arts classes exceeded the mandated performance level.

**Table 8:** Sixth Grade Male CRCT Language Arts Scores at XYZ Middle School for School Years 2002-2003 and 2003-2004 (Heterogeneous) and 2004-2005 and 2005-2006 (Single Sex).

Group One-Heterogeneous 2002-2003 2003-2004		Group Two-Single Sex 2004-2005 2005-2006	
Did Not Meet	90	Did Not Meet	62
Met Requirements	160	Met Requirements	209
Exceeded	44	Exceeded	33

Group	Group One-Heterogeneous	Group Two-Single Sex
Mean	98.00	101.33
SD	58.41	94.36
SEM	33.72	54.48
N	3	3

P value and statistical significance:

The two-tailed P value equals 0.9610

By conventional criteria, this difference is considered to be not statistically significant.

Confidence interval:

The mean of Group One minus Group Two equals -3.33  
95% confidence interval of this difference: From -181.23 to 174.56

### *Discussion*

There was an increase in the number of sixth grade males who met the state's minimum requirement on the language portion of the CRCT when compared to the number of sixth grade males from heterogeneous language arts classes. However, this increase did not provide sufficient basis for the differences in scoring levels to warrant statistical significance.

### *XYZ Middle School*

#### *Finding # 9-Math-Males*

XYZ offered heterogeneous math classes in sixth grade in the school years 2002-2003 and 2003-2004. There were 294 males in these classes during that two year period. The results of the CRCT given to these students indicates that 81 of these male sixth grade math students did not meet the minimum performance level as required by the State of Georgia whereas 160 of their male peers did attain an adequate performance level on the math portion of the CRCT. Left were 53 of the original 294 and these 53 exceeded the state's minimum performance level.

For school years 2004-2005 and 2005-2006, XYZ Middle School enrolled a total of 314 male students in their sixth grade single sex math classes and of these 332 male students, 88 failed the meet the minimum scoring standards. A total of 193 did meet the acceptable performance standard as mandated by the state. There were 51 of these male sixth grade students from single sex classes who exceeded the minimum score as prescribed by the State of Georgia.



**Table 9:** Sixth Grade Male CRCT Math Scores at XYZ Middle School for School Years 2002-2003 and 2003-2004 (Heterogeneous) and 2004-2005 and 2005-2006 (Single Sex).

Group One-Heterogeneous 2002-2003 2003-2004		Group Two-Single Sex 2004-2005 2005-2006	
Did Not Meet	81	Did Not Meet	88
Met Requirements	160	Met Requirements	193
Exceeded	53	Exceeded	51

Group	Group One-Heterogeneous	Group Two-Single Sex
Mean	98.00	104.67
SD	55.49	70.47
SEM	32.04	40.68
N	3	3

P value and statistical significance:

The two-tailed P value equals 0.9038

By conventional criteria, this difference is considered to be not statistically significant.

Confidence interval:

The mean of Group One minus Group Two equals -6.67

95% confidence interval of this difference: From -150.44 to 137.11

### *Discussion*

As the figures in Table 9 suggests, a cursory examination of the test results from both heterogeneous and single sex sixth grade math classes, demonstrates little difference in the scores of heterogeneous and single sex math scores among the two classes of males and a statistical analysis utilizing the t-test indicates there is no statistical significance between the two classes in regard to test results in math on the CRCT.

*XYZ Middle School**Finding # 10-Reading-Females*

Heterogeneous sixth grade classes in reading at XYZ Middle School for school years 2002-2003 and 2003-2004 contained 268 females. Of this total, 21 did not attain an acceptable score on the reading section of the CRCT. Of those undertaking this portion of the CRCT from this total of female sixth grade students, 93 successfully met the acceptable scoring levels according to state mandates. The number exceeding the minimum acceptable score from this group of females from heterogeneous classes was 268.

**Table 10:** Sixth Grade Female CRCT Reading Scores at XYZ Middle School for School Years 2002-2003 and 2003-2004 (Heterogeneous) and 2004-2005 and 2005-2006 (Single Sex).

Group One-Heterogeneous 2002-2003 2003-2004		Group Two-Single Sex 2004-2005 2005-2006	
Did Not Meet	21	Did Not Meet	25
Met Requirements	93	Met Requirements	189
Exceeded	152	Exceeded	86

Group	Group One-Heterogeneous	Group Two-Single Sex
Mean	88.67	100.00
SD	65.61	82.89
SEM	37.88	47.86
N	3	3

P value and statistical significance:

The two-tailed P value equals 0.8617

By conventional criteria, this difference is considered to be not statistically significant.

Confidence interval:

The mean of Group One minus Group Two equals -11.33

95% confidence interval of this difference: From -180.79 to 158.12.

### *Discussion*

There was a notable difference in the reading scores on the CRCT between the number of female sixth grade students from heterogeneous classes who successfully exceeded the acceptable score levels on this test when compared to sixth grade females from single sex reading classes who exceeded on this portion of the test. Further, the number of females from single sex reading classes who met the minimum scoring requirements was over double that of female students from heterogeneous reading classes. However, these differences in scoring levels notwithstanding, a t-test analysis did not note any statistical significance between these two classes on the reading test of the CRCT among sixth grade females.

### *XYZ Middle School*

#### *Finding # 11-Language Arts-Females*

The sixth grade language arts classes at XYZ Middle School were heterogeneous during the school years 2002-2003 and 2003-2004 and had 268 females enrolled in those classes. Notably, 153 of a total of 267 these female students exceeded the generally required performance level on the language arts section of the CRCT. In contrast, 21 failed to meet the minimum scoring level on this section of the test and 93 successfully met the minimum requirements as direct by state policy.

The sixth grade female students enrolled in single sex language arts classes at XYZ Middle School during school years 2004-2005 and 2005-2006 undertook the language arts section of the CRCT. Of a total of 301 students were enrolled in the sixth grade language arts during the two years of single sex classes and of that total 32 students received scores which were below the acceptable level as warranted by the State of Georgia. Another 217 female students from sixth grade single sex language arts classes were successful in their efforts to attain the acceptable performance level while 52 of their classmates exceeded the minimum requirements.

**Table 11:** Sixth Grade Female CRCT Language Arts Scores at XYZ Middle School for School Years 2002-2003 and 2003-2004 (Heterogeneous) and 2004-2005 and 2005-2006 (Single Sex).

Group One-Heterogeneous 2002-2003 2003-2004		Group Two-Single Sex 2004-2005 2005-2006	
Did Not Meet	21	Did Not Meet	25
Met Requirements	93	Met Requirements	189
Exceeded	152	Exceeded	86

Group	Group One-Heterogeneous	Group Two-Single Sex
Mean	89.00	100.33
SD	66.09	101.53
SEM	38.16	58.62
N	3	3

P value and statistical significance:

The two-tailed P value equals 0.8791

By conventional criteria, this difference is considered to be not statistically significant.

Confidence interval:

The mean of Group One minus Group Two equals -11.33

95% confidence interval of this difference: From -205.53 to 182.86

### *Discussion*

The number of sixth grade females from heterogeneous language arts classes that exceeded the generally acceptable minimum score on the reading portion of the CRCT was almost double that of sixth grade females from single sex language arts classes who undertook the reading portion of the CRCT. The number of female sixth grade students from single sex language arts classes who met the minimum scoring standard established by the state was over double that of those sixth grade female students from heterogeneous language arts classes taking the reading portion of the test. There was little difference in the number of female sixth grade students who did not meet the minimum scoring requirements on the language arts section of the CRCT when heterogeneous and single sex classes were compared. The t-test analysis dictates there was no statistical significance among the scores.

### *XYZ Middle School*

#### *Finding # 12-Math-Females*

In school years 2002-2004, XYZ Middle School offered heterogeneous math classes which contained 267 female at the sixth grade level. On the math portion of the CRCT, a total of 46 students did not meet the state's minimum scoring requirements whereas 174 did meet these requirements. The balance of the sixth grade female

students, 47, exceeded the mandated minimum scoring requirements on the math section of the test.

Two years later, in school years 2004-2005 and 2005-2006, XYZ Middle School recorded 301 females in single sex math classes at sixth grade. A total of 73 students did not score sufficiently high as to meet the state's minimum requirements on the math portion of the CRCT. There were 196 female sixth grade students from single sex math classes who did meet the state's minimum scoring requirements and the balance of students, 32, exceeded the state's minimum scoring requirements.

**Table 12:** Sixth Grade Female CRCT Math Scores at XYZ Middle School for School Years 2002-2003 and 2003-2004 (Heterogeneous) and 2004-2005 and 2005-2006 (Single Sex).

Group One-Heterogeneous 2002-2003 2003-2004		Group Two-Single Sex 2004-2005 2005-2006	
Did Not Meet	46	Did Not Meet	76
Met Requirements	174	Met Requirements	196
Exceeded	47	Exceeded	32

Group	Group One-Heterogeneous	Group Two-Single Sex
Mean	89.00	101.33
SD	73.61	84.88
SEM	42.50	49.01
N	3	3

P value and statistical significance:

The two-tailed P value equals 0.8585

By conventional criteria, this difference is considered to be not statistically significant.

Confidence interval:

The mean of Group One minus Group Two equals -12.33  
95% confidence interval of this difference: From -192.44 to 167.77

### *Discussion*

As an examination of the figures for both the heterogeneous and single sex classes for sixth grade females in math indicate, differences in the numbers of students scoring at each level of the math portion of the CRCT are very small. The t-test analysis suggests there is no statistical significance in a comparison between the two classes regarding their scoring levels.

### Cumulative Analysis of CRCT Scores

The CRCT scores for the sixth grade heterogeneous math, reading and language arts classes at ABC Middle School and XYZ Middle School for school years 2002-2003 and 2003-2004 were compared, using the t-test method, to the CRCT scores of sixth grade single sex classes in math, reading and language arts for the school years 2004-2005 and 2005-2006 from both schools. The analysis involved the following:

1. The sixth grade CRCT scores for all three domains, both sexes and each school year (2002-2006) were converted from percentage representations published by the Georgia Department of Education to numerical values in terms of actual students.
2. The CRCT scores for sixth grade males in heterogeneous math, reading and language arts classes for the years 2002-2003 and 2003-2004 were combined to produce a single unit for comparison.
3. The CRCT scores for sixth grade females in heterogeneous math, reading and language arts classes for school years 2002-2003 and 2003-2004 were combined to form a single unit for comparison.

4. The CRCT scores for sixth grade males in single sex math, reading and language arts classes for school years 2004-2005 and 2005-2006 were combined to form a single unit for comparison.
5. The CRCT scores for sixth grade females in single sex math, reading and language arts classes for school years 2004-2005 and 2005-2006 were combined to form a single unit for comparison.
6. CRCT scores for sixth grade males and females in heterogeneous classes in each of the three domains were disaggregated as follow:
  - a. Number of students who did not meet the minimum performance requirements on the CRCT math, reading and language arts as mandated by the State of Georgia.
  - b. Number of students who met the acceptable performance requirements mandated by the state in math, reading and language arts.
  - c. Number of students who exceeded the acceptable performance level as mandated in math, reading and language arts.
7. CRCT scores for sixth grade males and females in single sex classes in each of the three domains were disaggregated as follow:
  - a. Number of students who did not meet the minimum performance requirements on the CRCT math, reading and language arts as mandated by the State of Georgia.
  - b. Number of students who met the acceptable performance requirements mandated by the state in math, reading and language arts.



- c. Number of students who exceeded the acceptable performance level as mandated in math, reading and language arts.

The comparison of CRCT test scores for heterogeneous male sixth grade students at ABC Middle School in math for the school years 2002-2003 and 2003-2004 to those of sixth grade male students in single sex math classes at ABC Middle School for the same school years, using the t-test as a statistical measurement, indicated there was no significant difference in scoring levels. The scoring levels are based upon the student not meeting the minimum performance standard, meeting an adequate level of performance or exceeding the minimum acceptable level of performance on that particular portion of the CRCT.

In regard to the second content domain, reading, a t-test analysis of CRCT testing scores for heterogeneous male sixth grade classes in reading to those of sixth grade males enrolled in single sex classes in reading suggested there was no significant difference in scoring levels between the two classroom environments in regard to performance on the reading section of the CRCT based upon the three tiered criteria of does not meet, meets and exceeds the minimum performance standards.

The results of a comparison of the CRCT scores in language arts suggest a related conclusion. The t-test analysis of testing results indicate there exist no significant differences between the CRCT scores of heterogeneous sixth grade males in language arts when compared to those CRCT scores in language arts of sixth grade males in single sex classes using the three tiered criteria mandated by the State of Georgia.

A similar result was evident in the comparison of CRCT scores among sixth grade females from both classroom environments. The CRCT scores in the math section of that

assessment for sixth grade females in heterogeneous math classes were not significantly different, according to the t-test analysis, than those of sixth grade females enrolled in single sex math classes. Likewise, the reading and language arts scores among sixth grade females from both heterogeneous and single sex classes who undertook the CRCT were not significantly different when analyzed statistically using the t-test.

Based upon the statistical analysis of the data, there exists no significant difference between the CRCT scores of heterogeneous females and males on any of the three content domains when compared to the CRCT scores on the same content domains of females and males from single sex classes.

#### Disciplinary Referrals

The term disciplinary referral, as used in this study, represents the means by which a classroom instructor refers a student to the office for punitive consequences for some infraction which resulted in the disruption of the classroom. The student is usually accompanied to the office with a form completed detailing the infraction and other relevant information.

One of the primary assertions of supporters of single sex instruction is their contention that separating the sexes, especially at the middle school level, reduces the frequency of classroom disturbances because separation of males and females eliminates the target of behaviors by both sexes designed to impress each other. In order to examine these assertions, the number of disciplinary referrals from sixth grade at ABC Middle School and XYZ Middle School for the school years 2002-2003 and 2003-2004 were obtained. During these two years, both schools offered heterogeneous classes in math, reading and language arts.

As a matter of contrast and comparison, the number of disciplinary referrals issued during the school years 2004-2005 and 2005-2006 at both ABC and XYZ Middle Schools were collected. During these two school years, both middle schools offered single sex classes in math, reading and language arts. The number of disciplinary referrals issued during the two year period at ABC Middle School during which there were only heterogeneous sixth grade classes (2002-2003 and 2003-2004) were combined to form one statistical unit and the quantity of disciplinary referrals for the school years 2004-2005 and 2005-2006 during which single sex classes were offered at sixth grade level, were also combined to form a statistical unit. It should be noted that the number of disciplinary referrals for school year 2002-2003 for ABC Middle School is an estimation based upon the average yearly percentage of referrals issued. The actual number of referrals was not available from ABC Middle School.

The frequencies of disciplinary referrals from both classroom environments were disaggregated as follows:

Disciplinary Referrals-Heterogeneous ABC Middle School

**Table 13:** Frequency of Disciplinary Referrals at ABC Middle School.

*Disciplinary Referrals--Heterogeneous*

ABC Middle School-2002-2003 .....	798
ABC Middle School-2003-2004 .....	945
Total	1,743

### Disciplinary Referrals-Single Sex

ABC Middle School-2004-2005.....	655
ABC Middle School-2005-2006 .....	497
Total	1,152

In order to examine the statistical significance of the frequencies of disciplinary referrals between sixth grade heterogeneous classes and those of single sex sixth grade classes, the number of disciplinary referrals for the heterogeneous sixth grade classes at ABC Middle School for the years 2002-2003 and 2003-2004 and the frequency of disciplinary referrals from the single sex sixth grade classes of 2004-2005 and 2005-2006 were statistically compared using the chi-square method of measurement.

This chi-square measurement employs Fisher's exact test. Fisher's exact test is used in the analysis of categorical data where sample sizes are small and is used to examine the significance of the association between two variables in 2 x 2 contingency table. The p-value from the test is computed as if the margins of a 2 by 2 table are fixed values. The p-value represents the probability that the sample used could have been drawn from the population(s) being tested.

In this analysis, the p-value is less than 0.0001. The p-value indicates there is a statistical association between the number of disciplinary referrals issued to sixth grade homogeneous students in the school years 2002-2003 and 2003-2004 and the quantity of disciplinary referrals issued to single sex sixth grade students in single sex classes in school years 2004-2005 and 2005-2006. In this analysis, an analysis in which .05 is the threshold, meaning any p-value at or above this figure reduces the statistical significance of the comparison whereas a p-value below the .05 threshold increases statistical

significance as the p-value descends in value.. Because the p-value of this analysis is considerably below the .05 threshold there is a substantially statistical significant relationship between heterogeneous and single sex classes.

### *Discussion*

According to the Chi-Square statistical measurement, there is substantial significance between the disciplinary referrals of the heterogeneous sixth grade classes of 2002-2003 and 2003-2004 and those issued during the school years of 2004-2005 and 2005-2006 during which time ABC Middle School offered single sex classes at the sixth grade level. This significance suggests that separating the sexes at the sixth grade level reduced the frequency of classroom disruptions resulting in disciplinary referrals at ABC Middle School.

#### Disciplinary Referrals—Heterogeneous XYZ Middle School

**Table 14:** Frequency of Disciplinary Referrals at XYZ Middle School.

XYZ Middle School-2002-2003 .....	41
XYZ Middle School-2003-2004 .....	102
Total	143

#### Disciplinary Referrals-Single Sex

XYZ Middle School-2004-2005.....	90
XYZ Middle School-2005-2006 .....	273
Total	363

#### XYZ Middle School Disciplinary Referrals Analysis Using Chi-Square

In order to examine the statistical significance of the frequencies of disciplinary referrals between sixth grade heterogeneous classes and those of single sex sixth grade

classes, the number of disciplinary referrals for the heterogeneous sixth grade classes at XYZ Middle School for the years 2002-2003 and 2003-2004 and the frequency of disciplinary referrals from the single sex sixth grade classes of 2004-2005 and 2005-2006 were statistically compared using the Chi-Square method of measurement.

This Chi-Square measurement employs Fisher's exact test. Fisher's exact test is used in the analysis of categorical data where sample sizes are small and is used to examine the significance of the association between two variables in 2 x 2 contingency table. The p-value from the test is computed as if the margins of a 2 by 2 table are fixed values. The p-value represents the probability that the sample used could have been drawn from the population(s) being tested.

In this analysis, the p-value is less 0.3696 which exceeds the .05 threshold. This p-value indicates there is not a statistical association between the number of disciplinary referrals issued to sixth grade homogeneous students in the school years 2002-2003 and 2003-2004 and the quantity of disciplinary referrals issued to single sex sixth grade students in single sex classes in school years 2004-2005 and 2005-2006. In this analysis, an analysis in which .05 is the threshold, meaning any p-value at or above this figure reduces the statistical significance of the comparison whereas a p-value below the .05 threshold increases statistical significance as the p-value descends in value.. Because the p-value of this analysis is considerably above the .05 threshold there is an absence of a statistically significant relationship between the frequencies of disciplinary referrals in heterogeneous and single sex classes at sixth grade at XYZ Middle School.

### *Discussion*

According to the Chi-Square statistical measurement, there exists no statistical significance between the disciplinary referrals of the heterogeneous sixth grade classes of 2002-2003 and 2003-2004 and those issued during the school years of 2004-2005 and 2005-2006 during which time XYZ Middle School offered single sex classes at the sixth grade level. This lack of significance suggests that separating the sexes at the sixth grade level did not reduce the incidence of classroom disruptions, insubordination and acts of disrespect at XYZ Middle School. In fact, the incidence rate of these infractions appears to have more than doubled at XYZ Middle School during the school years 2004-2005 and 2005-2006 during which time the school employed single sex sixth grade classes when compared to the incidence of disciplinary referrals experienced by XYZ Middle School during the school years 2002-2003 and 2003-2004 during which time this middle school offered only heterogeneous classes in math, reading and language arts.

#### Summary

The CRCT scores from ABC Middle School in sixth grade math, reading and language arts for school years 2002-2003 and 2003-2004 (heterogeneous classes) were compared to the CRCT scores for the same sixth grade content areas for school years 2004-2005 and 2005-2006 (single sex) at ABC Middle School using a t-test for statistical measurement. The results of this comparison demonstrated that the separation of the sexes at the sixth grade level at ABC Middle School did not result in an increase in student performance as measured by the CRCT in any of the three content areas tested and analyzed for statistical significance.

A similar conclusion was drawn from the analysis of the CRCT scores for sixth grade math, reading and language arts at XYZ Middle Schools. The t-test analysis of

CRCT scores for math, reading and language arts for school years 2002-2003 and 2003-2004 (heterogeneous) and CRCT scores for the same content areas for school years 2004-2005 and 2005-2006 (single sex) indicated there was no statistically significant increase in student performance in any of the three content areas tested and analyze for statistical significance at XYZ Middle School.

The issue of disciplinary referrals was addressed using the chi-square measurement for statistical significance. The number of disciplinary referrals issued during the school years 2002-2003 and 2003-2004 at sixth grade level at ABC Middle School were statistically compared to the number of disciplinary referrals issued to sixth grade students at ABC Middle School for the school years 2004-2005 and 2005-2006. The statistical analysis suggested a substantial reduction in the number of disciplinary referrals issued to sixth grade single sex students during 2004-2005 and 2005-2006 during which time ABC Middle School employed single sex classes when compared to the frequency of disciplinary referrals issued to sixth grade students at ABC Middle School during the school years 2002-2003 and 2003-2004 during which time ABC Middle School offered only heterogeneous sixth grade classes.

At XYZ Middle School, the chi-square analysis of disciplinary referrals suggested a converse result. When the number of disciplinary referrals for heterogeneous sixth grade students for the school years 2002-2003 and 2003-2004 were statistically compared to the number of disciplinary referrals issued to sixth grade students for single sex classes for the school years 2004-2005 and 2005-2006, the results indicated there were substantially more disciplinary referrals issued to sixth grade students enrolled in single sex classes than were issued to sixth grade students in heterogeneous.



## CHAPTER V

### SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

This study was undertaken to examine the influences, if any, that classroom environment, specifically heterogeneous or single sex, exerts on student achievement as measured by the CRCT and student classroom behavior as measured by disciplinary frequencies at the sixth grade level. The impetus for this study resulted from modifications in federal law concerning instructional pedagogies as well a renewed interest by educators and other stakeholders in revisiting this traditional method of instruction in attempts to address problems in student achievement and behavior.

In the spring of 1972, the Nixon Administration added a series of amendments to the Elementary and Secondary Act of 1965 (ESEA, 1965) referred to as the Educational Amendments (Educational Amendments, 1972) most of which were designed to address perceived racial and sexual inequities of the time. One of these amendments, Title IX specifically prohibited sexual discrimination by any entity, public or private, receiving federal funds (Flansburg & Hanson, 1993).

By definition, this prohibition directly impacted the thousands of public schools, colleges and universities throughout the nation. Prior to Title IX, the practice of single sex instruction had been prevalent in American education for well over a century (Jennings, 1995) and while Title IX did not specifically mandate the discontinuance of single sex instruction, the practice became widely perceived as sexually discriminatory and thus began a gradual decline (Hansot, 1993).

Almost three decades later as the Bush Administration entered office after the 2000 election, the U.S. Department of Education served notice that as part of the

administration's national educational policy, No Child Left Behind, the department was considering relaxing the restrictions placed on single sex instruction in public classroom thereby affording educators the opportunity reexamine single sex instruction as an additional instructional tool (U.S. Dept. of Education, 2002). The rationale supporting the relaxation of the restrictions on single sex instruction was based upon the perception that public education should possess the same instructional flexibility as private schools, educational institutions with a history of single sex instruction dating centuries (Sommers, 2002).

While the proposed relaxation of the restrictions on single sex instruction was welcomed by some in education (Sax, 2005), others, especially among civil rights and women's rights organizations, considered the proposed modifications regressive and an endangerment to progress realized in efforts to reduce sexual discrimination (Flansburg & Hanson, 1993). Further, opponents of the proposed changes asserted there is little research to support the contention that single sex instruction increases student achievement and improves student behavior (AAUW, 1998).

The issue of student behavior is considered by supporters of single sex instruction as the catalyst leading to improved student academic performance. According to supporters, separating the sexes, especially at the middle school level, has the potential of reducing classroom disruptions. As a result, supporters of single sex instruction insist a reduction in time spent on classroom management leads to additional time on task thus increasing the potential to improve student achievement (Sax, 2005).

### Analysis and Discussion of the Research Findings

This study examined these assertions using a quantitative research method. The quantitative approach is based upon the use of sixth grade CRCT testing data derived from the Georgia Department of Education which included sixth grade students in heterogeneous math, reading and language arts at ABC Middle School and XYZ Middle School and sixth grade students in the same content areas in single sex classrooms involving the same three primary content areas at the same two middle schools. While these data are represented by the Department of Education as percentages of students attaining certain levels of academic performance on this standardized test, these figures have been converted to represent the actual numbers of students who attained certain performance standards in the primary content areas of math, reading and language arts as established by the State of Georgia. These standards include student scores ranging from failure to attain the minimum acceptable level of performance to meeting the mandated level of academic performance in a specific content domain and, in the final category, exceeding the minimum scoring requirements in a specific content domain.

The CRCT scores for heterogeneous sixth grade students in reading, math and language arts for the years 2002-2003 and 2003-2004 were compared to the CRCT scores of sixth grade students enrolled in single sex classes in reading, math and language arts for the school years 2004-2005 and 2005-2006 at both ABC Middle School and XYZ Middle School. This comparison, using the t-test as a means of statistical measurement for significance, indicated that in none of the content areas did single sex sixth grade students, males or females, performed at a higher level on the CRCT than those students from sixth grade heterogeneous classes.

In regard to the issue of student behavior, a chi-square analysis of the data was used to determine statistical significance. The frequency of disciplinary referrals for ABC Middle School for the school years 2002-2003 and 2003-2004 (heterogeneous) were compared to the frequency of disciplinary referrals at ABC Middle School for the school years 2004-2005 and 2005-2006 (single sex). The results of the chi-square analysis indicated a substantial statistical significance between the two time periods and the two classroom environments with improvements in the single sex classroom. Conversely, results of the chi-square analysis of disciplinary referrals for XYZ Middle School for 2002-2003 and 2003-2004 (heterogeneous) when compared to the frequency of disciplinary referrals for the school years 2004-2005 and 2005-2006 (single sex) indicates the separation of the sexes at XYZ Middle School did not reduce classroom management problems. There was a notable increase in the incidence frequencies of disrespect, insubordination and classroom disruption during the period in which single sex classes were employed.

Possible explanations for this increase in incidence frequency at XYZ Middle School during the years in which single sex instruction was used include:

1. Modifications to rules and regulations which narrowed definitions of infractions which would lead to an increase in the incidence of disciplinary referrals.
2. Increased referrals by instructors seeking to attain additional control in the classroom in order to reduce classroom disruptions. These efforts toward increased control may have been manifest in the creation of more stringent behavioral guidelines which would include less tolerance for minor

infractions and an increase in the quantity of rules regarding behavior in their classrooms.

3. Inherent decreases in opportunities for students to socialize with the opposite sex in the single sex environment. The lack of opportunities to socialize with the opposite sex might well have resulted in increased non-academic and academic competition in the classroom among males and females..
4. The student population in sixth grade at XYZ Middle School during the years of 2004-2005 and 2005-2006 may have experienced substantial growth which would increase teacher to student ratios which might proportionally increase the probability of classroom disruptions, acts of disrespect and insubordination.

#### Conclusions and Implications

Based upon analysis of the data, it can be concluded that in this particular study, separating the sexes at sixth grade level did not improve student achievement but did, however, reduce the frequency of disciplinary referrals and classroom disruptions at one middle school, ABC Middle School. At XYZ Middle School, not only did student achievement not increase during the two years of single sex instruction, the issues of classroom management and time on task were not influenced in a positive manner. This is not to suggest that single sex instruction is not a functional methodology or does not possess potential to improve student achievement. Other studies have concluded that improvements in student achievement have been realized through separating the sexes in middle school. The one common benefit shared by a majority of the schools practicing

singles sex instruction is a reduction in classroom disruptions which reduces the amount of class time instructors are required to allocate to classroom management. Whether this reduction in classroom disruptions results in increase time on task or improved student achievement is still open to question. At least at one school examined in this study, XYZ Middle School, separating the sexes at sixth grade did not reduce discipline referrals.

### Recommendations

This examination of single sex instruction has illuminated certain issues which this researcher suggests warrant further inquiry. While there existed for a few years a trend among public schools to implement single sex instruction, this trend appears to be abating marked by decreases in the number of schools implementing this instructional approach and the quantity of schools maintaining the program (NASSPE, 2008).

One possible reason for this trend can be attributed to the limited number of successes in single sex programs in public schools. Underlying this lack of success is the manner in which some of the programs have been implemented. For example, in 1993 when the State of California established their single sex schools (six such schools) the state legislature did not allocate sufficient funding, according to researchers, to maintain the facilities and resources required to implement and continually maintain the program in the schools. Thus, adequate funding has been a chronic problem for some systems implementing single sex instruction. One reason for this funding problem includes the creation of the single sex program to coincide with a heterogeneous program at the same level in the same school. Thus, funding for both programs is required because both programs require facilities, technology, professional training for staff and curriculum resources.

A second ongoing issue may arise from the notion of some system leaders that a simple transition of putting males in one class and females in another is required to make the leap from heterogeneous to single sex classes and schools (Datnow, Hubbard & Conchas, 2002). This issue contributes to an associated problem; that of instructor training. Researchers have long suggested that males and females have different learning styles. One of the assertions of supporters of single sex instruction suggests that current methodologies do not accommodate these learning differences. By separating the sexes at the middle school level, instructors would have the opportunity to exploit these learning differences through specialized instructor training according to advocates of single sex instruction. In a vast majority of cases which this researcher has reviewed, few of the instructors in single sex programs had received any specialized training in addressing learning differences between males and females. Hence, the methodologies these instructors had used in heterogeneous classrooms were often simply transferred to their single sex classrooms. Accordingly, whatever possible benefit might have been realized instructionally by separating the sexes was diminished by the lack of instructional skills considered essential in accommodating male and female learning differences (Ferrara, 2005). Further research into these learning differences and the manner in which instructors involved in single sex instruction and heterogeneous classes can be trained to exploit these differences is greatly needed.

A final issue of concern is the manner in which single sex programs are implemented. In some instances, school systems implement single sex instruction as a panacea for declining student achievement, especially as measured on standardized assessments. The trend of single sex instruction as a means of improving student

achievement is only one of scores of programs commercially available and designed to address student achievement problems. School systems, seeking simple answers to complex achievement problems, often go from one program to another with little to show for their efforts.

The process of implementing single sex programs in schools, especially in heterogeneous schools, is demanding in terms of time and funds. The cost of implementing the single sex program in a middle school is increased because instructors must be trained to address and exploit in a positive manner the learning differences between males and females. Texts, assessments and other resources designed for the single sex classroom must be acquired. Time is required to design and implement the program in terms of assigning instructors, scheduling of classes, meetings with stakeholders, policy meetings and professional development.

The successful transition to single sex classes from heterogeneous classes has been characterized by deliberate planning encompassing a clear understanding of the long term objectives of the program, the allocation of adequate funding and resources, training of personnel, the involvement of other stakeholders and the acute awareness that positive results, if any, may not be immediately forthcoming. To implement a single sex program, or to make any major program change of any type, without these factors taken into account, significantly diminishes the prospects of a successful program (Datnow, Hubbard & Conchas, 2002).



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APPENDIX A  
QUALITATIVE ITEM ANALYSIS

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Item	Research	Research Question
1. Middle School Design	Wiles & Bondi, 2001	2
2. Role of the Middle School	Alt & Choy, 2000	2
3. Individual Motivation	Ecsles and Midgeley, 1989	1, 2
4. Individual Changes	Ecker, 2002	1, 2
5. Learning Differences	Sax, 2005	1
6. Self Esteem	Ecker, 2002	1. 2
7. Maturity	Wiles & Bondi, 2001	1, 2
8. Puberty	Wiles & Bondi, 2001	2
9. Adolescence	McAdoo, 1999	1
10. Independence	McAdoo, 1999	1
11. Personal Identity	Eccles & Midgeley, 1989	1, 2
12. Middle School Pedagogy	Chadbourne, 1999	1
13. Transition	Battaglia & Randall, 2005	2
14. Physical Attractiveness	Brownlee, 1999	1
15. Hormonal Incitement	Brownlee, 1999	1
16. Male-Female Interaction	O'Reilly, 2000	2
17. Disruptions	O'Reilly, 2000	1