

SINGLE-SEX EDUCATION: EFFECT ON ACHIEVEMENT AND ENGAGEMENT
OF AFRICAN-AMERICAN STUDENTS IN URBAN PUBLIC SCHOOLS

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ABSTRACT

SINGLE-SEX EDUCATION: EFFECT ON ACHIEVEMENT AND ENGAGEMENT OF AFRICAN-AMERICAN STUDENTS IN URBAN PUBLIC SCHOOLS

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The purpose of this study was to provide insight on whether providing a single sex educational environment to inner-city African-American students helped to improve students' achievement and school engagement.

A purposive sample of all students in grades three through six enrolled in single sex classrooms in a public school in a large urban city was included in this research. Comparison groups were selected from a neighboring public schools, ensuring the most consistency across demographic variables. Students completed two surveys: the School Engagement Survey (Fitt & DuCette, 2001) and the Estes Attitude Scale – Revised (Estes, Estes, Richards & Roetiger, 1981). Also, achievement data for these students were collected via a state sponsored school district data warehousing system. Students were also asked to participate in same sex, same grade focus groups. Ten teachers of these students were asked to participate in individual interviews.

Results indicated that students in single-sex classes had statistically higher means than students in coeducational settings on the School Engagement Survey sections of Positive Self Perception, Positive Teacher Belief, and Positive School Environment. Also, students in coeducational settings had statistically higher means on the Estes

Attitudes Scales for the subject of mathematics. Students who were enrolled in single-sex classes for more than one year had higher scores on standardized mathematics tests. Although single-sex and coeducational students start at approximately the same level for both reading and math, the single-sex students consistently score higher than their coeducational counterparts. Additionally, the results showed no significant gender differences on any of the measures of attitudes or achievement.

Teachers did not drastically change their instructional approach after being assigned to a single-sex classroom but they did change their approach to behavior management. Teachers do not participate in quality, ongoing professional development to support their practice as teachers of a single-sex class. Both boys and girls seem to enjoy the attention they receive in single-sex classes. Boys and girls also expressed a feeling of comfort in the single-sex setting. Boys and girls alike expressed enjoyment of all school subjects including mathematics and science. Girls and younger boys perceived themselves as being much more academically successful in the single-sex classroom. Boys in grades five and six perceived themselves as failing academically and they blame the bad behavior exhibited in their all boys' classes.

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CHAPTER 1

INTRODUCTION

Background

In reports and legislation such as *A Nation At Risk* (1983) and *No Child Left Behind* (2001), it has been clearly asserted that American schools are failing. While this concern about the low levels of achievement of students in America is generic, the greatest attention has been focused on the achievement of minority students in under-resourced urban schools. Recent concern has been expressed about the devastating failure of boys in particular. According to Gurian (2005), 70% of failing grades are given to boys, boys make up 80% of discipline problems, 70% of children diagnosed with learning disabilities are boys, and 80% of children diagnosed with behavior disorders or who are prescribed medication for behavior related issues are boys. Gurian also reports that 80% of high school dropouts are boys and a mere 44% of the college population is made up of males. With the publication of her book *The War Against Boys*, Christina Hoff Sommers (2000) argued that schools are actually shortchanging boys, not girls as other authors had previously asserted.

Since there is an increasing perception that boys in general, and minority boys in particular are being ill served in schools, a number of educational reforms have been proposed to remediate this problem. One of the most discussed and most controversial of these reform efforts is the movement to create single-sex classrooms and single-sex schools. Preliminary findings from a review of studies conducted by the United States Department of Education (2005) indicate that single-sex private and Catholic schools improved academic performance, particularly among poor, African American, and Latino

students. However, despite these findings and recent widespread implementation of single-sex education, there is a surprising lack of current empirical evidence that such schools actually have an impact on either boys or girls. The core purpose of the present dissertation is to address this paucity of research on single-sex schools.

Historical Background

Since the 1800's, coeducation has been the status quo in American public education. However, many private, independent or religious schools stayed with the European tradition of single-sex education despite the trend in the opposite direction. Throughout the sixties' and seventies' civil rights era, concerns about gender equity in education arose. In 1972, congress passed Title IX which prohibited sex-based discrimination in any federally funded school, college or university. This law did permit, however, single-sex admission policies at elementary and secondary schools as well as private colleges and universities.

Throughout the nineties, many schools offering single-sex options had opened or attempted to open across the country. In 1991, Detroit school officials planned to open an academy for African American boys but the federal court prohibited this opening (*Garrett vs. The Board of Education*, 1991). The American Association of University Women ([AAUW], 1999) became the most vocal group opposing single-sex education. AAUW filed a complaint when the Young Women's Leadership Academy was formed in Harlem. No action was taken by the Department of Education and this school remains open and successful today. On the west coast, six grant-funded schools offered single-sex classrooms to California students. These schools offered single-sex classrooms for only two years, the duration of the grant (Hubbard & Datnow, 2005).

Incentive grants to open single-sex public schools were offered under President Bush's educational reform package that later became No Child Left Behind (2002). Title IX regulations were revised in 2002 relaxing the law's stance on single-sex education in federally funded schools. According to the National Association of Single-sex Public Education ([NASSPE], 2006-2008), only four schools offered single-sex educational settings for students that year. As of the 2008-2009 school year, at least 442 public schools in the United States are offering single-sex educational opportunities. Most of those are coeducational schools which just offer single-sex classrooms. Of the above mentioned 442 public schools offering single-sex educational opportunities in the United States, several are located in Philadelphia (NASSPE, 2006-2008). While there seems to be an explosion of public single-sex schooling in the last five years, very few studies have been done in public settings and even less in elementary schools. This is disconcerting because, of the 442 public schools offering single-sex options, a high percentage consists of elementary schools (NASSPE, 2006-2008).

Most research done on the effects of single-sex education has taken place in private or Catholic school settings (Riordan, 1985). According to a systematic review of research completed by the United States Department of Education (2005), students in single-sex private or Catholic schools fared better than their coeducational counterparts in all but one area (subjective satisfaction). In concurrent and long-term academic achievement, 34% of the studies found results favoring single-sex education, as compared with only 2% supporting coeducation. In socioemotional development, including such constructs as self-concept, self-esteem, attitudes towards school, and subject preference, 45% of studies supported single-sex education while 10% supported

coeducation. Additionally, a number of other studies reported in the United States Department of Education review of research found null or mixed results.

Although we may be able to extract best practices for teaching boys or girls from research conducted in private and Catholic schools, real comparisons with public schools are difficult to make. When students attend a private or Catholic school, they do so by choice. Although private and Catholic schools often offer scholarships and financial aid, the student body is primarily students from the middle- or upper-class. Private and Catholic schools also enjoy the opportunity to hand select students through admission policies. Even when controlling for one or all of these variables, making a comparison between these schools and public schools is insufficient. Research comparing public coeducational students and students enrolled in single-sex public schools, especially at the elementary level, is desperately needed.

There is also a body of literature comparing single-sex schools to coeducational schools internationally, where often public schools offer single-sex options. Studies implemented internationally have provided mixed results. When comparing students in single-sex versus coeducational high schools in England, Spielhofer, O'Donnell, Benton, Schagen, and Schagen (2002) found that single-sex schools were particularly beneficial to girls with previous lower academic achievement. These authors also found that boys and girls in single-sex schools were more likely to enroll in higher level mathematics and science course. The results of another English study by Stables (1990) indicate that single-sex education may reduce gender preferences for different school subjects. A study in New Zealand found that when parental background, school behaviors, and previous academic ability were controlled for, students in single-sex schools scored statistically

significantly higher than the students enrolled in coeducational schools (Woodward, Fergusson, & Horwood, 1999). Not all international studies, however, are in support of single-sex education. Studies in Nigeria, Ireland, Belgium, Thailand and Japan produced mixed or null results (United States Department of Education, 2005).

Problem

The opportunity to conduct the research that is presented in this dissertation occurred because of a fortunate set of circumstances. From 2001-2005, I was the instruction specialist for a group of schools managed by the educational management company called Successful Schools. Successful Schools is a for profit educational management company that is based in large urban city. Successful Schools manages a number of charter schools in there and was hired to manage several Philadelphia public schools as a result of the state take-over reform effort of the School District of Philadelphia. Successful Schools has implemented a number of educational reform innovations including a new reading program and the inclusion of teacher coaches in each of their schools. Of interest here, however, is the the creation of single-sex classrooms in public elementary, middle and high schools.

This movement toward single-sex education represents what Cook and Campbell (1979) call a naturally occurring quasi-experiment. Since single-sex education has been brought into the schools managed by Successful Schools in a series of phases, it is possible to evaluate the impact of this innovation by analyzing various data sources across time. Specifically, Successful Schools began by meeting with school district officials and community organizations to discuss a variety of reform methods including single-sex education. From those meetings, it was decided that only one of the six schools

managed by Successful Schools would offer single-sex classrooms at the middle school level. This change occurred in the 2002-03 academic year. On the basis of the perceived success of this initial effort Successful Schools was given permission to open single-sex high schools, provide single-sex classrooms in another middle school, and to begin converting their elementary schools to single-sex classrooms. At this point, no systematic evaluation of this effort has been carried out. It is the goal of this dissertation to provide a research study that has implications for single-sex education within this specific context.

The proponents of single-sex education argue that this innovation should improve academic achievement for both boys and girls. Moreover, there is a belief that this improvement should occur because the students will be more engaged in school activities and have more positive attitudes towards educational pursuits. If this is true then students should demonstrate higher standardized achievement scores and should have better attendance in school. If students improve in these ways, then it follows that teachers would be strong supporters of single-sex education. Very few efforts have been made to ask the teachers or the students whether they approve of this educational reform or what they perceive to be its strengths and weaknesses.

Research Questions

To provide information on single-sex education in public schools, the following research questions will be answered in this dissertation:

1. Does single-sex education have an impact on attitudes toward school and achievement for students in grades three through six?
2. Is the impact of single-sex education different for boys as contrasted to girls?

3. What are the teachers' perceptions of the strengths and weaknesses of single-sex education?
 - a. Are these perceptions affected by teacher training?
 - b. Are these perceptions affected by the grade level taught?
 - c. Are these perceptions affected by the specific gender taught?
4. What are the students' perceptions of the strengths and weaknesses of single-sex education?
 - a. Are the perceptions of the boys different from the perceptions of the girls?
 - b. Are the students' perceptions related to grade level?

Research Design

A purposive sample of all students in grades three through six enrolled in single sex classrooms in a Successful Schools school was selected for inclusion in this research. Comparison groups were selected from a neighboring Philadelphia School District school, ensuring the most consistency across demographic variables. Students completed two surveys: the School Engagement Survey (Fitt & DuCette, 2001) and the Estes Attitude Scale – Revised (Estes, Estes, Richards & Roetiger, 1981). Also, achievement data for these students were collected via a state sponsored school district data warehousing system called eMetrics. These data were analyzed through analysis of variance. Students were also asked to participate in same sex, same grade focus groups. The teachers of these students were asked to participate in individual interviews. The transcripts of the focus groups and interviews were analyzed using the constant comparative method (Glaser & Strauss, 1967).

Definitions

For the purposes of this research, the following terms will maintain these distinctions:

Single-sex Classrooms (SSC) - schools that offer classrooms separated by gender but have both boys' and girls' classrooms and coeducational classes within the same school

Single-sex Schools (SSS) - schools that are open exclusively to one gender

Single-sex Education (SS) - a method of organizing schooling providing either SSC or SSS or both

Coeducational Education (CE) - the traditional method of organizing schooling, where both boys and girls are educated together

Educational Management Organization (EMO) – a company, university, or community group that receives state funding to maintain the operation of particular schools in the larger school district (e.g., Successful Schools)

CHAPTER 2

LITERATURE REVIEW

Introduction

It could be argued that the history of American education is a history of failed reform efforts. More than almost any other nation or group, Americans seem to be critical of their educational system as a matter of national identity. This environment of critique permeates most of the large-scale reviews of education, from the Coleman Report (1966), through *A Nation at Risk* (1983) up to *No Child Left Behind* (2001). Whether these criticisms are correct or incorrect, and whether they are really about all American schools or only about schools in urban, under-resourced areas, is perhaps less important than the simple fact that Americans seem continually convinced that their schools are failing.

This criticism of American schools, although often broad-based, is most clearly focused on students in urban schools, many of whom are minorities. For example, the following data are taken from the National Assessment of Educational Progress (2007) demonstrating the discrepancy in reading proficiency between minority students in general, and minority boys in particular. The data in Table 2.1 show the percentages of racial groups scoring at proficient or above in reading in the eighth grade disaggregated by the students' sex.

Table 2.1
*Percentage of Various Groups Demonstrating Reading Performance
 at a Proficient or Advanced Level*

	Males	Females
White	33%	46%
Black	9%	16%
Hispanic	12%	18%
Asian	35%	45%
Overall	26%	36%

It is difficult to review the data in Table 2.1 without some degree of concern. As demonstrated in the table, the group with the highest percentage reading at proficient or above (white females) is less than 50%. Equally disturbing is the fact that only 9% of black males and 16% of black females are reading at a level termed *proficient*.

Additional data are equally alarming: the rate of special education placement for males is almost twice the rate for females; only 43% of males attend college as contrasted to 57% of females; fewer than 50% of the males who attend college ever graduate as contrasted to almost 60% for females (National Assessment of Educational Progress (2005)).

Within urban school districts, the disparity between minority and non-minority students is troubling. Moreover, when analyzing achievement data according to race and sex, this disparity becomes disturbing. Although African-American and Latino boys have received much of the recent attention as media attention attempts to illuminate the *boy problem*, their minority female counterparts also continue to fare far below non-minority groups. Leake and Leake (1992) point out that enrollment of African American males in

colleges and universities is dropping at a distressing rate (34,000 between 1976 and 1986). Additionally, Leake and Leake add that 40% of African American males are functionally illiterate and the percentage of African American males in prison is 13 times greater than the percentage of African American males in college. Problems of this pervasiveness with such dire outcomes indeed require solutions of enormous magnitude.

In light of these clear and continuing achievement gaps, many attempts have been made to address these issues. These include the following:

1. Title I is a federal program for students from economically disadvantaged backgrounds. Title I funds are provided to schools where a high percentage of the student body come from such backgrounds.
2. The small schools initiative is a program that has been implemented in several urban centers by creating smaller and more focused schools (particularly high schools).
3. The standards-based curriculum was established to address the inequity of curriculum between urban and suburban schools. The curriculum in urban schools is often inferior to the curriculum in suburban schools. All states have created a set of standards which are intended to determine what students must learn to graduate from elementary, middle and high school.
4. The Charter schools movement was created with the assumption that market forces would help improve failing schools. Publically funded charter schools also offer parents educational options for their children within the public education setting.

While all of these reform efforts have their advocates, and while there are data supporting each of these, it would be incorrect to state that there is any consensus on how to remediate the acknowledged problems in American education. Given this, educators have tried a number of programs that, while not clearly supported by data, seem to have the potential to make a difference. One of these recent reform efforts is single-sex education.

The current interest in single-sex education was based on four major factors. First, Sadker and Sadker (1994) found that adolescent girls were being systematically excluded and overlooked in classrooms where adolescent boys were also in attendance. Since the evidence was clear that boys too often dominate the environment of a classroom and a teacher's attention, it was felt that girls were losing some of the benefits they might achieve by school attendance. Secondly, other writers (Gurian (2005), Riordan (2003), Sax (2005), and Sommers (2000) were pointing out that it was adolescent boys in general, and minority boys in particular, who were demonstrating a series of increasingly negative school-related failures often resulting in dropping out. Thirdly, either because of these factors, or in parallel to them, the enrollment in single-sex private schools was rapidly expanding. This increasingly meant that the most qualified and highest achieving students were leaving public schools to attend these private schools (Salomone, 2003). Finally, due largely to political factors with the dominance of conservative governments in the 90's with their belief in school choice and the effect of market forces on education, a great number of charter schools were being created (Salomone). The combined effect of these forces led educators in several parts of the country to advance the idea that a viable experiment would be to create single-sex schools. As one writer comments:

Historically, families with money have had a choice to send their children to single-sex schools in the form of private schooling. By providing single-sex education in the public schools, all students, including those in poverty and minorities, will have the same choices as those who can afford private schools. (Hughes, 2006, p. 10)

Background

History

In early America, colonists valued education for the purposes of religious study and promoting economic success. Grammar schools opened across the colonies focusing on educating boys in the areas of literacy, mathematics and Latin. These schools also existed to prepare boys to go to college. In colonial America, public education was available to boys only. During these early years, girls were typically educated in the home. With the opening of the *common school*, girls were gradually integrated into the public education setting. Common schools located in rural areas began coeducation due to the financial hardship of educating boys and girls separately (United States General Accounting Office, 1996). “By 1890, coeducation was clearly the most common model for public schools; in a survey of 628 U.S. school superintendents, only 41 reported having single-gender schools.” (United States General Accounting Office, p. 2) By the middle of the 19th century, girls and boys were equally represented in public schools.

This equality of opportunity, however, did not produce equality of outcome, at least in the views of many influential writers and policy makers. As mentioned previously, many writers in the last two decades of the 20th century were convinced that public education was significantly failing females at all levels of education. Carol Gilligan (1993), with her much debated seminal work *In a Different Voice*, sparked

important research in the areas of female adolescent development, gender differences and the effects of schooling.

In her later research on students at the Emma Willard School, Gilligan underscored adolescence as a critical period in the lives of women. She called it a watershed in female development, a time when girls are in danger of drowning or disappearing. She found that between the ages of twelve and thirteen (the age, she noted, when dropping out of school becomes more common in the inner city), girls' knowledge seems to be buried. (Salomone, date, p. 212)

It was not Gilligan's intention to support, or have her work support single-sex education.

This she made clearly known in an affidavit filed in the case against the Citadel (Salomone, 2001).

Next to fuel these fires were Myra and David Sadker (1994) and their controversial book, *Failing at Fairness: How America's Schools Cheat Girls*. "The Sadkers found that boys dominated classroom discussion and were more likely to be praised, corrected, helped, and criticized by teachers – all reactions that foster students' achievement, so they argued." (Salomone, 2001, p. 213) This book also gave unintended support to the growing interest and debate over single-sex education.

At the same time that Gilligan and the Sadker's were publishing their influential books, the American Association of University Women ([AAUW], 1992) published *How Schools Shortchange Girls*, a report that also covered the perils facing girls in American schools. In combination, Gilligan, the Sadkers and the AAUW illuminated the conditions for girls being educated in a system that was, in their combined expert opinions, cheating them (Salomone, 2001). "The data (from their research) also generated a flurry of activity

in school districts around the country with single-sex mathematics and science classes suddenly gaining favor.” (Salomone, p. 213)

In 1999, the AAUW published a follow-up report to *How Schools Shortchange Girls* called *Gender Gaps: Where Schools Still Fail Our Children*. This report attempted to update the information about the performance of girls in school since their last report. This report listed many favorable outcomes for girls in American schools. According to the AAUW:

- the gap in the number of mathematics and science classes taken by girls as contrasted to boys diminished,
- there were more girls enrolled in high level mathematics classes,
- the enrollment of girls in Advanced Placement classes improved greatly, of students enrolled in AP classes, girls were more likely to take the voluntary test to get credit for these courses,
- the gap in standardized test scores in mathematics and science between girls and boys shrank.

What was encouraging to the AAUW was that these advances did not seem to come at the expense of areas where girls had traditionally demonstrated an advantage over boys. It was pointed out in this report, for example, that girls’ enrollment in upper level English classes remained high. This effect, combined with the addition of the writing section on the PSAT, meant that girls were able to maintain their advantage in some areas, and eliminate or at least decrease their historical disadvantages in other areas. There were still deficits according to the AAUW, especially related to technology and perceptions about the use of technology. It was noted that girls encounter fewer role models in

technology fields and in software and games. Girls use computers less often outside of school and they perceive that boys are naturally better at technology. Still, despite these areas where girls do not achieve at the same level as boys, the general trend was perceived as demonstrating that girls were eliminating or at least diminishing the gap between themselves and boys in academic pursuits.

It has been argued that this improvement in the academic performance of girls is one of the major reasons for the recent focus on the academic difficulties of boys. Even more pointedly, the recent literature (Gurian, 2005, Slocumb, 2004; Smith, 2005; Von Drehle, 20) has focused not only on boys in general, but has narrowed this focus to minority boys in particular. This attention to the problems that minority boys face is evidenced by this recent onslaught of popular literature on boys in general that has heightened that discussion and highlighted the concern about minority boys specifically.

As Mead (2006) commented:

...girls have just improved their performance on some measures (of academic achievement) even faster (than boys). As a result, girls have narrowed or even closed some academic gaps that previously favored boys, while other long-standing gaps that favored girls have widened, leading to the belief that boys are falling behind. (p. 2)

Mead (2006) goes further in arguing that the media hype of a boys' educational crisis is nothing more than a conspiracy to make money and promote old agenda. She believes that by cherry-picking findings and cloaking data through creative presentation, a cottage industry has been created selling books and articles purporting to help parents and teachers use brain research and research on gender differences to improve boys' academic achievement. "In other words, few of these commentators have anything new to

say – the boy crisis has just given them a new opportunity to promote their old messages” (Mead, p. 16).

The ‘Boy Turn’ as it has been called by Hightower (2003) in a review of research on gender and education is due to a multitude of factors. According to Hightower this new attention to the education of boys has been brought about by news events such as school shootings, feminist theory and the quest for gender equity, and the politically charged claim that girls have made such great strides that they have surpassed boys on many measures. Additionally, he attributes this new attention on boys as a result of the economy and the increasing role of women in the workforce. Hightower reviewed four types of literature in his review. First, he reviewed popular-rhetorical literature which argues that boys are at a disadvantage in the feminized school culture of our society. Next, theoretically oriented literature that identifies types of masculinity and its effect were reviewed. Hightower also looked at practice-oriented literature which examined the school and classroom based interventions in the education of boys. Lastly, he reviewed feminist and pro-feminist literature which critiques the current moral panic over boys. Hightower (2003) concludes by saying:

The boy turn, however, still has many other contributions to make, including sometimes identifying problems that might place boys at a disadvantage – not overall, but in particular ways....The boy turn can indeed have progressive ends, but it requires vigilant steering. Because the boy turn shows no sign of running out of steam, such piloting is even more necessary now. (p.490)

With all of the polemics in this area, and with the heightened interest in the achievement of boys and girls (or, perhaps more importantly, boys versus girls), it is difficult to sift through all of the media hype to ascertain what is actually happening. The

truth seems to be somewhere in the middle of these widely diverging arguments. A middle ground summary of the current state of sex-based academic achievement would seem to be as follows: while girls may be doing better than they have in the past and boys may be doing better than they have in the past, there remains a significant gender gap in achievement. It is this gap that warrants attention no matter whether it favors girls or boys. Clearly, girls have received the print attention in the past that the boys are receiving currently.

It's likely that there is at least a grain of truth in all the different explanations being offered. The boy industry would not have the success it does if its arguments did not to some degree, resonate with the experiences of parents and educators." (Mead, 2006, p. 21)

According to the National Assessment of Educational Progress ([NAEP], 2005) long term data, boys are doing somewhat better than they were in 1971. In 2004, boys aged 9 and 13 increased their average scaled scores by 25 points and 18 points respectively in Mathematics compared to their 1971 counterparts. Boys aged 17 actually decreased by 1 point in their average scaled scores from 1971 to 2004. In reading, the gains are less for boys aged 9 and aged 13. Boys aged nine scored 15 points higher and boys aged 13 scored 4 points higher on their average scaled scores. Boys aged 17 decreased 1 point in reading as well. However, at all three age levels across reading and mathematics and across time, girls' scores were mostly higher than boys. NAEP calculates this gap by subtracting the female average scale score from the male average scale score. Negative numbers indicate that the average scale score for male students was lower than the score for female students. Table 2.2.a illustrates the recorded gaps for age levels and years for mathematics. Table 2.2.b illustrates the recorded gaps for age levels

and years for reading. In mathematics, there is no measurable difference between males and females until age 17. However, girls have done decidedly better than boys across all grade levels in reading with some gaps as high as double digits.

Table 2.2.
Gender Gaps as Measured by NAEP

<i>a. in Mathematics Achievement</i>				
		Male	Female	Gap
<hr/>				
Age 9				
	1971	218	220	-2
	2004	243	240	3
Age 13				
	1971	265	267	-2
	2004	283	279	3
Age 17				
	1971	309	301	8
	2004	308	305	3
<hr/>				
<i>b. in Reading Achievement</i>				
		Male	Female	Gap
<hr/>				
Age 9				
	1971	201	214	-13
	2004	214	221	-5
Age 13				
	1971	250	261	-11
	2004	254	264	-10
Age 17				
	1971	279	291	-12
	2004	278	292	-14
<hr/>				

It is evident from the material presented above that there has been a great deal of attention during the last 30 to 40 years focusing on the real or perceived gaps in achievement between boys and girls. Whatever the reality of this is, one of the most notable outcomes of this discussion has been the creation of single-sex schools. The next sections of this dissertation will review several of these areas of debate. First, a review of the legal arguments both for and against this movement are presented. This will be followed by brief explanations of several rationales for proposing single-sex schools. Finally, the empirical research that has attempted to evaluate single-sex education will be discussed.

Legal Issues

It is not surprising that offering single-sex schooling options in public schools has been controversial from both a theoretical as well as a legal perspective. In a press release, Former U.S. Secretary of Education, Rod Paige (United States Department of Education, 2004) commented that single-sex opportunities are “designed to provide educators and parents with a wider range of diverse education options in public as well as private schools that receive federal aid to meet the needs and interests of students” (p.1). Caplice (1995) asks what will happen if states and local school districts are not allowed to support school structure innovations that successfully address particular social, developmental, and academic problems? A warning from Caplice quickly follows her question: any issue that implicates the possibility of invidious gender discrimination will be a battleground of emotionally-laden issues. When discussing issues of equity, it is nearly impossible to divorce race from gender in conversations about education.

Single-sex schooling is often compared, by opponents, to racial segregation. Whether or not this comparison is legitimate, it is the case that many of the legal arguments for single-sex education hinge on the same set of issues. Several major cases (*Mississippi University for Woman v. Hogan*, 1982; *Vorchheimer v. School District of Philadelphia*, 1976; *United States v. Virginia*, 1996) set the historical context for publicly funded single-sex education. These cases suggest that as long as single-sex alternatives are offered to both sexes, single-sex educational opportunities would not contravene the Equal Protection Clause of the Fourteenth Amendment (Caplice, 1994). The Equal Protection Clause of the Fourteenth Amendment states:

No State shall make or enforce any law which shall abridge the privileges or immunities of citizens of the United States; nor shall any State deprive any person of life, liberty, or property, without due process of law; nor deny to any person within its jurisdiction the equal protection of the laws. (1868)

In *Mississippi University for Woman v. Hogan* (1982), a case was brought against the university by a man seeking admission to the women-only nursing program. Joe Hogan applied to Mississippi University for Woman because it was the closest nursing program to his home and therefore the most convenient to attend. The nearest coeducational nursing program was a two hour drive from his home. The Court decided “that no State now may provide even a single institution of higher learning open only to women students.” (*Mississippi University for Women v. Hogan*)

Ninth grade student Susan Vorchheimer brought a class action suit against the School District of Philadelphia in the 1976 case of *Vorchheimer v. School District of Philadelphia*. Looking for a high school with a strong academic program that she could attend, Vorchheimer visited Central High School for Boys and Philadelphia High School

for Girls. She was unimpressed with the all girls' option and decided to apply to Central High School based on its high academic reputation and strong college preparatory courses. Her application was denied based on her sex and thus Vorchheimer brought the sexual discrimination suit. "She (Vorchheimer) claimed that denying her the opportunity to attend Central had an adverse effect on her academic performance" (Gutman & Rosenblum, 1977). The district court decided that "the education available at Girls is substantially equal to that available at Central" (Gutman & Rosenblum, p. 151). Yet they also decided that the school district "failed to show that their policy of excluding females from Central bears a *fair and substantial relationship* to any of their legitimate objectives" (Gutman & Rosenblum, p. 153). The court granted *injunctive relief* stating that the district's policy was unconstitutionally against Vorchheimer by violating the equal protection clause of the 14th amendment. The Court of Appeals overturned this decision claiming that the courses at both schools were comparable and found that the district's policy did support the primary school district goal of providing the highest quality educational opportunity possible to all students. This decision required some interpretation of Title IX by the court. As Congress deliberately exempts high school admission from its prevue in Title IX, the court assumed that Congress left a door open for the possibility of single-sex schools. (Gutman & Rosenblum) By the early 1980's other girls were interested in attending Central High School. The lawsuits that followed their application pointed out the inequities between the schools and the courts ruled in favor of the plaintiffs. Central High School became coeducational yet Girls High has remained a single-sex institution.

In 1996, *United States v. Virginia* focused on the Virginia Military Institute (VMI), Virginia's only single-sex, higher educational institution. VMI's mission is to develop *citizen soldiers* using unorthodox methods to create physical and mental strength and to instill a strong moral code among students. The United States sued Virginia claiming that VMI's male only admission policy violated the equal protection clause of the 14th amendment. "The District Court ruled in VMI's favor. The Fourth Circuit reversed and ordered Virginia to remedy the constitutional violation" (*United States v. Virginia*). Virginia opened a comparable program at a nearby women's college which was deemed acceptable by the court.

In 1972, the United States Congress passed a set of amendments including Title IX which was intended to prohibit gender discrimination in all federally funded educational institutions. The actual United States Congressional Statute read as follows: "No person in the United States shall, on the basis of sex, be excluded from participation in, be denied the benefits of, or be subjugated to discrimination under any education program or activity receiving Federal financial assistance"(1988). Differing from the Equal Protection Clause of the Fourteenth Amendment which governs only state action, both public and private schools are affected by Title IX due to the federal funding provisions. Exemptions to this statute were provided for religious and military institutions, elementary and secondary schools and colleges that have been continually single-sex since their inception. Some might speculate that Congress provided these exceptions to allow single-sex to continue to be an educational option for students in the United States. "It appears that the overriding congressional goal of Title IX was not mandatory coeducation, but rather the eradication of discrimination at existing coeducational

colleges, which were the rule in 1972 and single-sex schools the exception” (Caplice, 1994, p. 268).

Later, Congress specifically addressed elementary and secondary schools in the Equal Education Opportunities Act of 1974 (EEOA). This act prohibits the denial of educational opportunity to individuals on account of his or her race, color, sex, or national origin. The act states specifically that “the deliberate segregation by an educational agency of students on the basis of race, color, or national origin among or within schools is prohibited”(1974). In the specifics of the act, the word sex was omitted implying again that the intention of Congress was not to eradicate single-sex education but to ensure the elimination of discrimination (Caplice, 1994).

Title IX was challenged in the Detroit case *Garret v. Board of Education* (1991) which kept the Detroit School District from opening three all male academies servicing boys from kindergarten through eighth grade. “Specifically, the court found that there is no evidence that the educational system is failing urban males because females attend schools with males. In fact, the educational system is also failing females” (Jacobson et al., 1995, p.12) “In its defense, the Board argued that the admission policies of elementary and secondary schools were expressly exempt from Title IX” (Gerson, 2005, p. 555).

Title IX’s new regulations were proposed in March, 2004 by the United States Department of Education (USDOE) and the Office for Civil Rights (OCR). These proposed regulations would make the opportunity for single-sex public educational settings available for those who are interested. To make this possible, the regulation “provide(s) additional flexibility in permitting single-sex schools and classes at the

elementary and secondary education levels consistent with the requirements of Title IX” (Gerson, 2005, p. 556). Under these new provisions, single-sex schools and classes must meet one of two criteria: (a) “provide a diversity of educational options to parents and students” and (b) “to meet the particular, identified educational needs of the students.” (Gerson, p. 557) Under the new Title IX, school districts are not required to seek approval or even permission to institute single-sex classes or schools.

At the heart of these new regulations are the ideas of *voluntary* and *substantially equal*. Participation in single-sex classes must be voluntary, that is, a school must offer a coeducational class as an option for those who do not wish to enroll in a single-sex class. When establishing a single-sex school a district must ensure that the members of the excluded sex are given substantially equal opportunities to attend another single-sex school or coeducational school (Gerson, 2005).

The increase in single-sex schools is at least in part due to changes in the laws governing education. As Gerson (2005) notes:

This sudden explosion was driven by an amendment to the NCLB of 2001 the purpose of which was ‘to provide for education reform programs that provide same gender schools and classrooms....’ The amendment specified that ‘school districts should have the opportunity to spend Federal educational funds on promoting single-sex opportunities so long as they are consistent with applicable law. (p. 555)

In sponsoring the amendment, Senator Kay Bailey Hutchinson pleaded with the Department of Education to give parents the choices in public school settings that would fit the needs of their particular child. (Gerson, 2005)

The fact that there is such a small body of law in this area, coupled with the problem that existing cases are both narrowly tailored and conflicting in outcome, makes the legalities of single-sex education

ripe for future court battles. In essence, the courts have yet to issue a broad-reaching ruling as to whether the admissions policies of public primary and secondary single-sex education are now covered under Title IX, or whether single-sex educational schemes, in their various incarnations, violate individuals' Fourteenth Amendment rights. (Jacobson et. al., 1995, p. 12)

Rationales for Single-sex Education

Although there is no consensus about the rationale for providing single-sex education, a number of arguments have been presented. These include the following.

The Physiological Argument

One of the arguments supporting single-sex education rests on the assumption that boys' and girls' brains are hardwired differently and that they mature at different rates for different tasks. According to researchers at Virginia Tech who studied the electrophysiologic imaging of 508 normal children ranging in age from 2 months to 16 years, the area of the brain involved in language and fine motor skills matures about four years earlier in girls than in boys. In contrast, these same researchers found that areas in the brain involved in geometry and spatial relations mature about four years earlier in boys than in girls. From these findings, the Virginia Tech researchers concluded that different areas of the brain develop in "a different order, time, and rate" in girls compared with boys (Sax, 2005).

In addition to these brain differences, the development of hearing and sight is drastically different for boys and girls. According to Sininger, Cone-Wesson and Abdala (1998), baby girls have an acoustic brain response 80% higher than baby boys. Confirming the assumption of these researchers that baby girls hear better than baby boys, Cassidy and Ditty (2001), studying 350 newborn babies, found that girls' hearing

was especially more sensitive in the 1,000 to 4,000 Hz range. This range is very important in the discrimination of speech and language.

Studies also performed with newborn babies, specifically on the day of their birth, indicate that there are sex differences in the anatomy of the eye. Babies were given a choice to look at the face of a smiling woman or a dangling mobile. The boys were more than twice as likely to look at the mobile rather than the smiling face. The eyes of boys have more magnocellular (m) cells in their retina while girls have more parvocellular (p) cells. The m cells are distributed across the retina and track objects anywhere in the visual field. The major function of m cells is to recognize and interpret movement. The p cells are located in the center of the retina and are responsible for interpreting information concerning color and texture (Connellan & Baron-Cohen, 2000).

It is clear from the information presented above that some evidence exists that there are differences in the brains of boys and girls. Whether these differences have a significant impact on educational outcomes is less clear. Over the past ten years, our knowledge of the brain, its development and function has increased immensely. What technology supports in terms of brain research today seemed unthinkable less than a decade ago. However, with the exponential advancement of technology, what we are currently capable of will seem quite elementary in the future. It is possible that we will ascertain that these brain differences do indeed have an impact on how boys and girls learn. If so, this will validate the physiological argument supporting single-sex education.

The Learning Styles Argument

It is argued that these above mentioned physiological differences give way to a multitude of differences in learning styles. As girls develop more quickly in language and

communication skills, they prefer to have complex content contextualized in everyday language. Also, because girls' hearing is better, they tend to be better listeners and prefer face-to-face auditory communication with their teacher. Boys often need movement to help stimulate less developed brain functions. Providing structured movement to boys also helps them to manage impulsive behavior. Girls often prefer to work in a cooperative group setting maximizing their communication skills. For boys, social structures among the group (athlete, popular, smart) can interfere with the accomplishment of the task (Gurian, 2003). While all of these arguments are reasonable, the evidence that such learning style differences exist is weak. More importantly, there is very little evidence that such differences, if they exist, have a significant impact on achievement for boys or girls. Nonetheless, proponents of single-sex education argue that it is easier for teachers to align instruction to students' learning styles when there is more homogeneity in style within the classroom. Since, assumedly, learning styles are linked to a student's sex, it follows that single sex classrooms should improve achievement.

The Classroom Contextual Argument

Before the beginning of the new millennium, the popular rationale for single-sex educational settings was that these settings minimized distractions caused by the opposite sex. It makes sense, then, that single-sex options take place as students reach late middle school and high school. "By far, the advantage most often associated with schooling boys and girls separately is that it eliminates distraction. Freed from the worries of impressing the opposite sex, boys and girls can focus on their books" (Vail, 2002, p. 35). Speaking from her personal experience as principal of the Jefferson Leadership Academies, Jill Rojas states that she was initially concerned that separating by gender would reinforce

gender stereotypes. In practice what happened was that girls and boys began feeling more comfortable breaking out of traditional roles: girls speaking up and taking leadership roles; boys willing to work collaboratively (Vail).

One of the outcomes of changing the educational context might be an improvement in the behavior of boys and girls. It is clear that some improvement in this area is needed. According to a report by the U.S. Department of Health and Human Services, National Center for Health Statistics (2008), boys represent a much higher percentage (17.6% boys versus 11.2 % girls) of the children whose parents sought mental health care due to emotional and behavioral difficulties. Of these referrals to mental health services, boys were twice as likely as girls to be medicated (6.6% compared with 3.4%). Boys were also more likely than girls to receive treatment for emotional or behavioral difficulties (6.4% compared with 4.2%). As one writer has commented: "It has been common to understand boys as bad for girls and girls as good for boys- - girls as a civilizing influence even when this disadvantages girls" (Tsolidis & Dobson, 2006, p 215).

An additional argument for single-sex education as a means of improving classroom climate is made by Hughes (2006):

Another characteristic of improved behavior is increased participation. Boys and girls, each in their own way, blossom in an environment free from the inhibiting factor contributed by the presence of the opposite sex. In single-sex classes or single-sex schools girls feel more comfortable participating in all facets of the lessons or activities....boys are more likely to work in collaborative settings when separated from the girl students, where they are free to express their emotions. (p 9)

The Choice Argument

Since the early nineties, application to and enrollment in private single-sex schools have risen dramatically. “Obviously, parents with the financial resources to exercise real choice see something positive in single-sex education” (Salomone, 2001, p 209). School choice, historically, has been afforded only to those students whose parents had access either financially or intellectually to alternate educational venues. With the rapidly expanding world of charter schools, the school choice movement has taken a step closer to the world of urban students. Armed with the knowledge that they have a voice in public education, parents of urban students are looking for options for their traditionally overlooked children. Single-sex educational settings can provide parents with choice. Whether parents fall on the girls’ side (girls are overlooked in coeducational classrooms) or the boys’ side (boys have been on an educational downslide leading to failure and dropouts), having the option in a free, public school suggests the hope of educational success for their children. These parents are not familiar with this type of success as past programs have not proven successful in raising the achievement of low-income minority students (Salomone).

Some would say that simply making a choice concerning the educational setting for their children suggests a level of concern or involvement of parents. This parental involvement can, in and of itself, be seen as an indicator of the value of education in the home setting. Riordan (1990) refers to this as a pro-academic choice. A pro-academic choice, a choice requiring the affirmative decision by students and parents, is an extremely important factor contributing to the success of students in school (Jost, 2002). Regarding choice and better educational options, Salomone (2003) puts it best in the

closing lines of her book entitled *Same, Different, Equal*. She says, "...public schools should afford students across the economic spectrum, and with potential greater personal and social returns, the same choice and opportunity historically enjoyed by those with the means to purchase them in the market of private schooling" (p. 244).

Summarizing the argument involving choice, Salomone (2001) says the following:

Energizing the debate is the school choice movement in its varied forms, not the least of which is the burgeoning world of charter schools...Families more than ever, and particularly those in the inner city, are looking to exercise more voice in the education of their children. No matter where one stands on the choice question, it is undeniable that the one-size-fits-all neighborhood school is slowly yielding to a new consumer-oriented model. (p 210)

Clearly there are various rationales for providing single-sex educational opportunities in public schools. Additionally, there have been legal debates and issues surrounding single-sex educational settings in publicly funded schools. Much of the debate about the worthiness of such educational opportunities happens in a court room or in popular literature. What is missing from these arguments is data-based evidence either supporting or refuting single-sex public education as a viable option for boys, girls or both.

The debate about the subject of single-sex education is something which has been going on for some years now. Despite the fact of this longstanding discussion, there is not enough sound, definitive research to be used to guide educators and policymakers. (Bracey, 2007, p. 22)

Current Research

In 2005, the U.S. Department of Education published a systematic review of research comparing single-sex educational settings with the more traditional coeducational setting. Recognizing the limitations of research concerning this topic, particularly with disadvantaged students, this report was commissioned to review the available research.

...in recent years there has been a resurgence of single-sex school in the public sector, it seems only fitting than an unbiased systematic review of single-sex education research that is interpretable and cognizant of other factors on the relationship between single-sex schools and educational outcomes be conducted. (DOE, 2005, p.1)

To begin the systematic review, an exhaustive search of the existing literature was conducted. A large number of studies, both qualitative and quantitative, were collected for examination of potential inclusion in the review. Through three phases of review with a focus on population and intervention, forty qualitative and four quantitative studies were included in the review. While this report covers outcomes across a wide range of educational constructs, of interest to me in light of this research are the outcomes concerning academic achievement, subject preferences, satisfaction with the school environment, and attitudes towards school in single-sex educational environments.

In the research reviewed, academic achievement was typically measured by a standardized achievement test designed to measure mastery of a particular curricular area. Of the studies included in the review, fifteen (35 %) reported results supporting single-sex schools, one (2 %) reported results supporting coeducational schooling, twenty-three (53 %) found null results and 4 (10 %) found mixed results. Although all of the studies

reporting outcomes on achievement included in the review were conducted in private or Catholic high schools, I found Riordan's findings to be of particular interest. When controlling for home background and cognitive ability, Riordan (1994) found significant effects favoring single-sex schools on a set of cognitive tests within a large sample of Black and Hispanic Catholic high school students. In other studies, Riordan (1985, 1990) also found support for single-sex schools. In comparing a single-sex Catholic high school with both Catholic and public coeducational high schools, Riordan (1985) found significant differences on measures of mathematics and verbal achievement. When comparing a single-sex Catholic high school with a coeducational Catholic high school, Riordan (1990) found significant differences in science achievement. In this study, when controlling for initial ability and home background, at-risk girls in the single-sex setting significantly outperformed the at-risk girls in the coeducational setting.

Course participation and course attitudes have been examined as outcomes relating to school subject preference. In the review of research related to subject preference, five studies supported single-sex schooling in favor of girls. Traditionally, mathematics and science have been academic areas as well as career paths dominated by boys. Lee and Bryk (1986) found that girls in single-sex high schools had statistically significantly higher interest in mathematics and were more likely to enroll in mathematics courses than girls in coeducational high schools. Spielhofer et al. (2002) compared students in single-sex versus coeducational high schools across England. In the single-sex setting, both boys and girls were significantly more likely to enroll in higher level mathematics and science courses than their counterparts in the coeducational schools.

School climate and culture, more generally referred to as *school environment*, is an important part of an educational setting. It can be assumed that if students find their school environment comfortable and supportive they will be more likely to attend and participate. Schneider and Coutts (1992) compared high school students in single-sex Catholic schools with high school students in coeducational Catholic schools. Statistically significant differences were found in the student perceptions of the school environment; the coeducational schools were seen as more pleasure-oriented with less emphasis on control and discipline.

“Attitudes toward school refer to any cognition by a student about school in general regardless of whether it is accompanied by a behavioral manifestation” (USDOE, 2005, p. 58). Of the five studies comparing attitudes toward school, one (20 %) produced results in favor of single-sex, one (20 %) produced results in favor of coeducation, one (20 %) produced null results and two (40 %) produced mixed results. One study comparing African American boys in grades 3, 4, and 5 enrolled in single-sex classrooms versus coeducational classrooms found significant differences supporting both the single-sex setting and the coeducational setting. When looking at academic achievement responsibility, fifth-graders enrolled in single-sex classrooms had higher self-reports of academic achievement responsibility than fifth-graders in coeducational classes. However, in the same study, third grade boys in the coeducational classrooms had higher self-reports of attitudes towards school than the third grade boys in the single-sex classes. On the same measure, no differences were found between the fourth and fifth grade students (Sanders, 1992). It is important to note that this was one of only three studies

involving elementary students included in the review. This further illustrates the surprising lack of research in this area.

Of the other studies involving elementary students, one was conducted in private schools in Northern Ireland. This study compared achievement data from all boys' and all girls' schools with coeducational schools. Null results were found across all measures (Daly & Shuttleworth, 1997). The third study pertaining to elementary students compared single-sex and coeducational settings in private Catholic elementary schools. Statistically significant differences were found supporting the single-sex setting on measures of self-esteem in boys. It bears repeating that if there is a resurgence of single-sex schools in the public sector, more research needs to be done. To continue to encourage and sustain this reform effort without empirical support would be negligent.

Research has also been conducted investigating the effects of single-sex education on teachers' attitudes and pedagogical behaviors in the classroom. This is based on the understanding that critical reflection on the pedagogical strategies must be part of the structural reform of widespread single-sex education. Martino and Meyenn (2002) interviewed seven teachers at a Catholic coeducational high school in Australia. This high school was opening single-sex classes in the English department to address the dismal performance of the boys. The Head of the Department had given teachers research that supported the idea that boys' literacy levels were much lower than girls perhaps because of the perception that reading and writing are feminine tasks as well as the lack of role models in the teaching staff. The teachers also participated in professional development provided by an outside presenter who confirmed the information the department head had disseminated to the teachers.

The teachers' perspectives on single-sex English classes provided insight into pedagogical practices and how these practices were modified in the newly formed single-sex classes (Martino & Meyenn, 2002). The teachers perceived the single-sex class environment to improve learning and self-esteem for boys and girls. This may be in part due to the teachers changing curriculum content to accommodate the individual interests of boys and girls. Teachers also perceived that this modification of pedagogy and curriculum reinforced stereotypical gender learning behaviors. These perceptions were collected both through interviews and the analysis of classroom discourse. As the authors note:

In doing so, we have drawn attention to some important issues relating to the effects of particular pedagogical practices which are attributable more to specific teacher knowledge and assumptions about gender than to the single-sex strategy per se. This raises critical questions about the relative absence of qualitative research into an examination of the specificities of teachers' pedagogical practices within the context of the implementation of single-sex classes and single-sex schooling. Furthermore, this research has implication for developing professional learning communities in schools based on enhancing teacher knowledge about the social construction of gender. The effect of this will be a more nuanced and critically reflective analysis of single-sex strategies in their capacity to reinforce gender stereotypical behaviors as opposed to creating spaces for interrogating and problematizing masculinities in the English classroom. (Martino & Meyenn, 2002. p 321)

Summary

In 1990, Riordan reviewed the existing research on single-sex education versus coeducation. At that time, he looked forward saying, "the real work on this issue lies ahead. We need better data and more interest and debate (on single-sex education)" (Riordan, p. xiii). It is my opinion that now, eighteen years later, we have the interest and the debate. The critical component still missing is the data. The lack of data on single-sex

schooling in the public sector is even more disconcerting as many public schools and districts are offering single-sex options for students based on popular opinions and fads. As Anfara and Mertens (2008) state: “The evidence generated in the United States in support of these claims is largely anecdotal, with much being reported in the popular press and conference presentations” (p. 55). It is clear that the time is long past where anecdotal evidence and popular press releases can serve as the basis for an educational innovation as pervasive as single-sex education. These are decisions that must be tempered by research. The research presented in this dissertation may begin to fill the disparity of missing data on the effects of single-sex education in public schools.

CHAPTER 3

METHODOLOGY

Introduction

This chapter delineates the methodology used to complete the research I conducted for this study. Included in this chapter are sections that: a) set the context of the study, b) restate the research questions, c) explain the research design, and d) describe the data collection procedures.

Context of the Study

In 2002, Successful Schools entered into a partnership with the School District of Philadelphia to assist in the redesign and management of five under-performing Philadelphia public schools. The Successful Schools partnership included three elementary schools and two middle schools. At one of the middle schools, Successful Schools implemented a highly innovative plan dividing the school into two single-sex academies. In 2003, Successful Schools expanded its relationship with the School District of Philadelphia by adding another middle school to the partnership. In 2003, the two middle schools shifted into small transitional high schools that service students in grades seven through twelve.

Successful Schools continued to transform their partnership schools. In 2004, another middle school was also divided into two single-sex academies. For the 2005-2006 school year, the two transitional high schools separated into two single-sex schools located on separate campuses. Also in the 2005-2006 academic year, one elementary school began to offer single-sex classes in kindergarten through grade six. In kindergarten through grade three mixed gender classes were also offered. In grades three

through six there were only single-sex classes offered. In the 2006-2007 school year, Successful Schools also instituted single-sex classes in their other two partnership elementary schools.

Successful Schools spent a great deal of time and effort to carefully plan the transition of these schools into what they are today. This process of changing educational environments to single-sex classes or single-sex schools has not been an easy one. Successful Schools held countless meetings with concerned parents and community organizations. Throughout this process Successful Schools also lobbied for support of school district administrators and local politicians. Some organizations such as the American Civil Liberties Union and the Philadelphia Women's Law Center have been in strong opposition to this transition, claiming any separation is inherently unequal. With the support of school district officials and the reissue of Title IX, however, Successful Schools continues to work with their partnership schools to provide single-sex educational options to the children of Philadelphia.

Restatement of Research Questions

As discussed in Chapter 2, there is a lack of empirical data to either support or refute the use of single-sex educational settings in public schools as a means to increase student achievement and close achievement gaps between boys and girls. Restated below are the research questions that comprise the purpose of this study. They are listed in two categories: Major Quantitative Research Questions and Major Qualitative Research Questions.

Major Quantitative Research Questions

The two questions that are answered using quantitative methods are:

1. Does single-sex education have an impact on attitudes toward school and achievement for students in grades three through six?
2. Is the impact of single-sex education different for boys as contrasted to girls?

Major Qualitative Research Questions

The two questions that are answered using qualitative methods are:

1. What are the teachers' perceptions of the strengths and weaknesses of single-sex education? Are these perceptions affected by teacher training, grade level taught, and specific gender taught?
2. What are the students' perceptions of the strengths and weaknesses of single-sex education? Are these perceptions different for boys and girls and are they related to grade level?

Research Design

As evidenced by the research reviewed in Chapter 2, much of the research on single-sex classes and schools has used quantitative designs comparing differences in achievement and subject preferences. Quantitative methods, used exclusively, will eliminate the voices of those most important in the single-sex initiative – the students and the teachers. The rich description provided by qualitative methods will allow for the inclusion of “data in the form of the participants’ own words.” (Merriam, 1998, p. 8) During my employment in the schools switching to single-sex settings, there were interesting conversations among the students and between the teachers. I recognized then that these conversations would be a valuable addition to a research design. Therefore, a

mixed model with multiple applications within all stages of study (inquiry, data collection, and analysis) was conducted in this study. Tashakkori and Teddlie (1998) define mixed model studies as: “studies that are products of the pragmatist paradigm and that combine the qualitative and quantitative approached within different phases of the research process” (p. 19).

Sample

At the Successful Schools, all students in grades three through six that are assigned to single-sex classes constitute the sample for the study. Students that have been enrolled at Successful Schools for multiple years have the potential to have more than one year of experience in a single-sex classroom. Like many other urban districts, Philadelphia experiences a high rate of transiency in the student population. There are some students that are having their first year of single-sex education because they have transferred into a single-sex classroom from a school that does not offer this choice to students. Table 3.1 gives an overview of the numbers of students in each grade and how many years they have participated in single-sex education.

Table 3.1
Length of Time Participants Were Enrolled in Single-sex Classrooms

	one year	two years	three years
Third Grade	15	7	
Fourth Grade	8	35	
Fifth Grade	9	34	
Sixth Grade	6	4	27

Of the students enrolled in the selected Successful Schools, approximately 90% qualify for free or reduced price school lunch. The student sample is made up mostly of African American students. Less than 1% of students enrolled in the selected schools are White and less than 2% are Latino. All students who participated in this research were enrolled in regular educational programs. Students enrolled in special education programs were excluded from this study. The major reason for this decision was that while special education students may be enrolled in single-sex classrooms, they participate in coeducational settings for a majority of the day in order to meet the instructional goals of their individual educational plans. Having such a limited experience in the single-sex setting has the potential to distort the responses from the special education students. Thus, I decided to eliminate them from the sample.

A comparison group was formed from a school located within the same geographical region. This school is a Philadelphia School District school not managed by an EMO. Students attending this school are closely matched demographically to the students attending the selected Successful Schools. Students in grades three through six were selected until the group size for each grade level was equivalent to the groups from the Successful Schools. When possible, classes were selected in their entirety to lessen variance due to the classroom teacher.

A purposeful sample of students was collected from each grade level and from both boys and girls. These students participated in the student focus groups sessions. As much as possible, these students were selected with input from the classroom teachers. Teachers were asked to indicate which students were more likely to be verbal with an

unknown researcher conducting the focus groups. Occasionally, a member of this sample was selected randomly from the class roll sheet.

A purposeful sample of teachers was also collected to participate in teacher interviews. This sample consisted of the classroom teachers that taught the single-sex classes included in this research. Table 4.8 in chapter four lists the teachers and their teaching assignment.

Instruments

Estes Attitude Scales - Revised

The Estes Attitude Scales (EAS) (Estes et al., 1981) was published to assess students' attitudes towards academic subjects. In the EAS manual, the authors assert that information about student attitudes can be invaluable in assessing the impact of a student's educational experience. They go on to define an attitude toward a content area as "a like or dislike of a given subject in school" (Estes et al., p. 4). While often good teachers will recognize general likes and dislikes, the EAS quantifies teacher observations as well as uncovers carefully masked feelings toward content areas. Traditionally, boys prefer mathematics and science while girls prefer language arts and social studies. The use of the EAS was used to help indicate what difference, if any, single-sex educational settings have on the impact to attitudes about specific school subjects.

The items on the EAS were developed from statements provided by teachers and students. Responses to the statements are coded in a 5-point Likert scale format from strongly disagree (1) to strongly agree (5). Two versions of the EAS were originally created, a secondary form, consisting of seventy-five items for students in grades seven

through twelve and an elementary form consisting of forty-two items for students in grades three through six. The secondary form produces attitude scores for five content areas: English, Reading, Social Studies, Mathematics and Science. The elementary form measures the attitudes of students in reading, mathematics and science. Regardless of the form used, students with higher scores on the EAS have more positive attitudes towards the content area than those with lower scores. Estes et al. (1981) have reported that the scales demonstrate adequate discriminant and content validity. Alpha coefficients measuring internal consistency of the subscales range from .76 to .93 with a median of .86.

The current version of the EAS, the Estes Attitude Scales – Revised (EAS-R)(Appendix A), is composed of fifty items with ten items measuring attitudes in five content areas: English, Reading, Social Studies, Mathematics and Science. For example, some sample items are: English class is too short; Books make good gifts; Social Studies is dull; Without Mathematics courses, school would be a better place; and Science classes are usually fun. EAS-R was developed by James (2001) as a response to the cumbersome nature of the original set of scales. Participants in James' study were required to complete multiple surveys; the EAS would have been too time-consuming. The factor loadings reported in the EAS manual provided a statistically defensible basis for selecting the items most centrally related to the constructs. For each of the content scales, James selected the ten items with the highest loadings. This method yielded a more concise version of the EAS with only fifty items total for elementary students. Students in grades three through six were administered the EAS-R with the elimination of the questions pertaining to English.

The EAS-R took approximately twenty minutes to administer with all items being read to students. Students indicated their response by placing a checkmark in the box corresponding to their answer (strongly agree, agree, cannot decide, disagree, strongly disagree). For the present study, students were told not to write their names or any other identifying information on the survey. Each survey was coded with an identification number for each student to allow for the alignment between all measures.

School Engagement Survey

The School Engagement Survey (Appendix B) was originally created by Fitt and DuCette (personal communication, May 16, 2006) to assess a variety of constructs related to a students' engagement in school. The original scale was intended to contain the following subscales: Maternal support, Paternal support, Peer support, Teacher support, Academic Engagement, Achievement Motivation and Fillers. In the initial data collection 582 students from a number of public and private schools in the northeastern section of the United States were administered the survey in grades six through twelve. A factor analysis of the items was used to reduce the item pool to a smaller number and to combine the subscales. A second iteration was produced reducing the items from 75 to 45. This was administered to 341 students in grades nine through twelve. These data were again factor analyzed and redundant and unnecessary items were eliminated. The current version of the scale contains 30 items in a 4-point Likert scale format. This version was administered to 812 students in grades 7 through 12. The factor analysis produced three robust constructs: Adult encouragement for academic achievement (My father encourages me to study), Academic engagement (My school is a good place to study), and future orientation (I believe I have a good future).

The version of the School Engagement Survey that was administered to the participants in this study consisted of 25 items. The items pertaining to parental support (My mother tells me to get a good job I need a good education) were removed. These particular items may be frustrating or discouraging to a student without a mother or father. As parental encouragement is not a construct I am interested in measuring, the modification of this survey serves the purpose of my research.

The School Engagement Survey took about 20 minutes to complete. As with the EAS-R, all items were read to the students. Students indicated their response by placing a checkmark in the box corresponding to their answer (strongly agree, agree, disagree, strongly disagree). Students were asked not to write their name or any other identifying information on this survey as well. Each survey was coded with an identification number for each student to allow for the alignment between all measures.

Pennsylvania System of School Assessment

The Pennsylvania Department of Education (PDE) began systematically testing students in Pennsylvania in the late 1960s as a result of legislation requiring state assessment of student achievement. PDE partnered with Educational Testing Service (ETS) to develop appropriate measures of student achievement for use statewide. The first iteration of this test was given to students in the 1969-1970 school year in the form of the Educational Quality Assessment (EQA) program. As the EQA became an established measure, it reported grade 5, 8, and 11 results in both cognitive and non-cognitive areas. A major revision to the testing system was conducted in 1984 resulting in the first mandated competency testing program called Testing for Essential Learning and Literacy Skills (TELLS). The TELLs program instituted testing in grades 3, 5, and 8 as

an *early warning system* and to assist in the distribution of state-funded remedial instruction. The EQA program and TELLS program coexisted until 1988 when the EQA program was discontinued. The TELLS program continued through to 1991 when the current system of assessment was put in place (Data Recognition Corporation, 2008).

The Pennsylvania System of School Assessment (PSSA) program began in 1992 requiring mandatory testing of students in grades 5, 8, and 11 in reading and mathematics and students in grades 6 and 9 in writing. In 1999, a major structural change took place in the PSSA as a result of the adoption of state standards in reading, writing and mathematics. “Subsequently, the State Board (PDE) approved a set of criteria defining Advanced, Proficient, Basic and Below Basic levels of performance. Reading and mathematics performance level results were reported at both the student and school levels for the 2000 PSSA” (Data Recognition Corporation, 2008, p. 2). The combination of establishing performance levels and becoming aligned with state standards made the PSSA a standards-based, criterion-referenced assessment that measured student attainment of state standards. Another revision to the PSSA was made in 2005 with the development of Assessment Anchors. Assessment Anchors were developed to clarify the content structure of the PSSA as well as improve the connection between assessment and instruction. At the time this study was conducted grades 3, 4, 5, 6, 7, 8, and 11 were being tested in reading and mathematics (Data Recognition Corporation, 2008).

Currently, PDE (2008) states the broad purpose of the PSSA program as “to provide information to teachers and schools to guide the improvement of curricula and instructional strategies to enable students to reach proficiency in the academic standards” (Data Recognition Corporation, p. 3). Specifically, the PSSA program will a) provide all

stakeholders with an understanding of student and school performance; b) determine how well school programs enable students to attain proficiency of state standards; c) provide information to schools for the purposes of strategic planning; d) provide information to policymakers and the general public about the ability of schools and school programs to support student proficiency in attaining state standards; and e) provide aggregate information to ascertain the proficiency level of student groups such as Economically Disadvantaged or English Language Learners (Data Recognition Corporation, 2008).

The following tables outline the number of questions per subject and percentage of questions per reporting category of the PSSA program for students in grades three through six. As previously mentioned, students in grades three through eight and eleven are tested in both reading and mathematics. However, my research focused only on students in grades three through six. Reporting categories are broad subsections derived from the Assessment Anchors that were created for this iteration of the PSSA. The reading portion of the test is broken down into two reporting categories and the mathematics test is divided into five reporting categories (Data Recognition Corporation, 2008).

Table 3.2 presents the number and type of question – multiple choice (mc) or open-ended (oe) per section and subject for students tested in grades three through six.

Table 3.2
Number and Types of Questions

Content by section	Grade 3	Grade 4	Grade 5	Grade 6
Mathematics	22 mc	22 mc	22 mc	22 mc
	2 oe	2 oe	2 oe	2 oe
Reading	24 mc	24 mc	24 mc	24 mc
	1 oe	1 oe	1 oe	1 oe
Mathematics	22 mc	22 mc	22 mc	22 mc
	2 oe	2 oe	2 oe	2 oe
Reading	18 mc	16 mc	16 mc	16 mc
	2 oe	2 oe	2 oe	2 oe
Mathematics	22 mc	22 mc	22 mc	22 mc
	1 oe	1 oe	1 oe	1 oe
Reading	16 mc	16 mc	16 mc	16 mc
	1 oe	1 oe	1 oe	1 oe

Table 3.3 presents the distribution of questions to the two reporting categories (Comprehension and Reading Skills, and Interpretation and Analysis of Fictional and Nonfictional Text) of the reading test for students in grades three through six.

Table 3.3
Reading Reporting Category Distribution

Grade	Comprehension and Reading Skills	Interpretation and Analysis of Fictional and Nonfictional Text
3	60-80%	20-40%
4	60-80%	20-40%
5	60-80%	20-40%
6	50-70%	30-50%

Table 3.4 presents the distribution of questions to the five reporting categories (Numbers and Operations, Algebraic Concepts, Geometry, Measurement, Data Analysis and Probability) of the mathematics test for students in grades three through six.

Table 3.4
Mathematics Reporting Category Distribution

Grade	Numbers and Operations	Algebraic Concepts	Geometry	Measurement	Data Analysis and Probability
3	40-50%	12-15%	12-15%	12-15%	12-15%
4	43-47%	12-15%	12-15%	12-15%	12-15%
5	41-45%	13-17%	12-15%	12-15%	12-15%
6	28-32%	15-20%	15-20%	12-15%	15-20%

According to the technical report published by PDE (2008), *The Standards for Educational and Psychological Testing* and *The Principles of Universal Design* were consulted in the development of the PSSA.

Alignment to the PSSA Assessment Anchors and Eligible Content, grade-level appropriateness, depth of knowledge, cognitive level, item/task level of complexity, estimated difficulty level, relevancy of context, rationale for distractors, style, accuracy and correct terminology were major considerations in the item development process. (p. 17)

Processes and procedures were also employed to ensure that the questions were not biased or insensitive to race, religion, culture or gender (Data Recognition Corporation, 2008).

Detailed and thorough item analyses were conducted for both reading and mathematics tests in the PSSA program to “ensure that the items and forms performed as expected”. Both item performance and item discrimination were investigated through proportion correct (P-Value) and point-biserial correlation. The results of these analyses are presented in a technical report published by PDE.

In general, with the mean P-values in the range of 0.65-0.87, the PSSA was reasonably challenging to most students; the exception being grade 3 mathematics, which seems to have been easier for students than other grade/subject pairs. With the average point-biserial correlations ranging from .36 to .43, the overall item quality was quite good. (Data Recognition Corporation, 2008, p. 82)

To establish content validity, PDE hired Achieve, Inc to review the test during the development of Assessment Anchors and Eligible Content. After revisions and modifications were made to meet the recommendations of Achieve, Inc. the current version of PSSA was established. PDE also commissioned an independent study of the

PSSA tests by Human Resources Research Organization (HumRRO) including convergent and discriminant validity. HumRRO found that the PSSA accurately and consistently represented academic content as specified with an appropriate level of item difficulty (HumRRO report, 2004). Construct validity was calculated using Pearson Correlation Coefficients. These calculated correlations “generally display the expected pattern and magnitude of correlations” (Data Recognition Corporation, 2008, p.175).

To calculate reliability, PDE used Cronbach’s Alpha, to indicate “the consistency over the responses to a set of items measuring an underlying trait, in this case reading and mathematics achievement” (Data Recognition Corporation, 2008, p.130). Table 3.6 presents Cronbach’s Alpha reliability indices for the reading and mathematics tests.

Table 3.5
Cronbach’s Alpha Reliability Indices

Subject	Points Possible	n	Mean	SD	P-value	Reliability	SEM
Reading	46	127,194	30.11	9.46	0.66	0.90	2.86
Mathematics	66	127,608	54.88	9.74	0.86	0.90	2.99

Focus Groups and Interviews

Groups of boys and girls participated in focus groups. The groups were separated by gender and grade level. The groups were composed of six to eight students that comprised a representative focus group for each grade level. Unstructured sessions guided by open ended questions (Appendix C) were held with each of these groups.

Students spent an average of 25 minutes in the focus group discussions. As I have worked with many of these students, an outside interviewer conducted these focus groups.

Teachers participated in one-on-one unstructured interviews (Appendix D) utilizing the *funnel interview* technique. This is an interview method “in which the researcher starts with very broad questions and gradually limits the scope of the questions to a few focused issues” (Tashakkori & Teddlie, 1998, p. 102). Tashakorri and Teddlie go on to argue that this interview method is most applicable to a mixed methods research design. While the interview was guided by the interview protocol, teachers were encouraged to discuss any issues related to their teaching in a single-sex public school. Each teacher spent an average of 35 minutes with the interviewer. As I have worked with many of these teachers, an outside interviewer also conducted these interviews.

CHAPTER 4

RESULTS

Section I

Overview of the Chapter

This chapter is presented in six sections. Section I contains an overview of the chapter and discusses the data issues that had to be dealt with prior to actual analysis. Section II contains the results of a factor analysis of the student engagement survey that was used in the study. Section III contains a summary of those analyses that were produced to directly answer the major research questions. Section IV contains a series of additional analyses that were conducted to answer questions that occurred in the process of analysis for the major research questions. Finally, Section V and VI contain the teacher interview data and the student focus group data. The chapter ends with a brief overview of the results (Section VII).

Data Issues

A number of issues were discovered in analyzing the data. First, there was a significant amount of missing data in the questionnaires that were completed by the students. While missing data are always a problem in research of this type, the analyses that were used are somewhat sensitive to these problems since they use a listwise deletion process. As a consequence, I made the decision to replace the missing data with the mean derived from the remaining sample. All of the analyses that are reported use this process. Another issue occurred that relates to the sample sizes. In a few cases (for example, the analysis of variance for School by Gender by Grade) some of the cell sizes were too

small to support the analysis. When this happened, the design was simplified so that the analysis could be conducted appropriately.

Section II

Factor Analysis of the School Engagement Survey

The instrument used to determine school engagement, although it has been used previously in other research is still considered an instrument under development. Therefore, I decided to factor analyze the 25 items and use the resulting factors as dependent variables. A principal components factor analysis with a varimax rotation was conducted. This produced eight factors with Eigenvalues over 1, six of which were viable. The rotated factor matrix with names assigned to each viable factor is presented in

Table 4.1
Rotated Factor Matrix for the School Engagement Survey

Factor I: Negative Engagement in School	
School Engagement Survey Item	Factor Loading
I only go to school to hook-up with my friends	0.69
I skip school when I think I can get away with it	0.63
I believe my teachers are glad when I skip school	0.56
Getting an education is not for me	0.47
Factor II: School Is Valuable	
School Engagement Survey Item	Factor Loading
I feel good when I learn things that will help me get a good job	0.73

Doing well in school is not important to me	-0.56
I believe school will help me to become a success someday	0.6
I think that going to school 3 days a week is enough	-0.46

Factor III: Influence of Peers on Engagement in School

School Engagement Survey Item	Factor Loading
I ask my friends over to my house to study	0.76
I sometimes study with my friends	0.76
My friends ask me to study with them	0.74

Factor IV: Positive Self Perception

School Engagement Survey Item	Factor Loading
Other kids make fun of me because I am smart	0.7
Most people consider me to be a good student	0.62
I believe I will get a good job someday	0.52
My teachers believe I am smart enough to go to college	0.48
I believe I have a good future	0.47

Factor V: Positive Teacher Belief

School Engagement Survey Item	Factor Loading
My teachers believe in me	0.8
My teachers believe that I have a good future	0.74

Factor VI: Positive School Environment

School Engagement Survey Item	Factor Loading
I like to study	0.67
My school is a good place to study	0.65
I don't care if I get in trouble at school	-0.51
I like it when I cause trouble in school and don't get caught	-0.5

To simplify the interpretation of the results the factor scores were converted to T scores (where the mean is 50 and the standard deviation is 10). All of the data from the School Engagement Survey will be presented in this format.

Section III

Analysis for Major Quantitative Research Questions

There were two major quantitative research questions for this research. These are: 1) Does single-sex education have an impact on attitudes towards school and achievement for students in grades three through six? and 2) Is the impact of single-sex education different for boys as contrasted to girls? Both of these questions were answered by a two-way MANOVA, with Group and Gender as the factors. These results are presented below.

Attitudes Towards School

A two-way MANOVA was conducted on the six factor scores retained from the factor analysis of the school engagement survey. The means and standard deviations for

the six factors for both coeducational (CE) students and students in single-sex (SS) settings are contained in Table 4.2.

Table 4.2
Descriptive Data on the School Engagement

		Male	Female	Total
Factor I	CoEd	50	50	50
	Single Sex	50.2	49.8	50
Factor II	CoEd	48.9	47.8	48.3
	Single Sex	50.5	51.1	50.8
Factor III	CoEd	48	49.1	48.6
	Single Sex	50.2	51.3	50.7
Factor IV	CoEd	45.6	50.2	48
	Single Sex	50.5	51.6	51
Factor V	CoEd	47.3	47.5	47.5
	Single Sex	50.5	52.1	51.2
Factor VI	CoEd	44.9	46.3	45.7
	Single Sex	51.3	53	52.1

The results of the two –way MANOVA are contained in Table 4.3

Table 4.3
Two-Way MANOVA Results for Factors from the School Engagement Survey

Source	Dependent Variable	df	Mean Square	F	η^2 p
Group	FACI	1	0.06	0	0
	FACII	1	285.1	2.85	0.01
	FACIII	1	221.72	2.21	0.01
	FACIV	1	452.95	4.64**	0.02
	FACV	1	698.01	7.13**	0.03
	FACVI	1	1975.92	21.55**	0.09
Gender	FACI	1	1.93	0.02	0
	FACII	1	2.57	0.02	0
	FACIII	1	57.61	0.57	0
	FACIV	1	380.57	3.9	0.02
	FACV	1	34.27	0.35	0
	FACVI	1	106.44	1.16	0
Group by Gender	FACI	1	2.41	0.02	0
	FACII	1	33.48	0.33	0
	FACIII	1	0.03	0	0
	FACIV	1	144.29	1.48	0.01
	FACV	1	20.2	0.2	0
	FACVI	1	0.86	0	0

The omnibus Wilk's Lambda tests indicate that there is a significant main effect for group, with neither the main effect for gender nor the interaction being significant. As demonstrated in Tables 4.2 and 4.3, there is a significant effect for group on Factors IV (Positive Self Perception), V (Positive Teacher Belief) and VI (Positive School Environment). In each case, the mean of the students in the single-sex schools is higher than the means for the students in the co-educational schools.

Attitudes Toward School Subjects

A similar two-way MANOVA was conducted on the four scales from the Estes Attitude Scales-Revised. The means are presented in Table 4.4 and the MANOVA results are presented in Table 4.5.

Table 4.4
Means for the Estes Attitude Scales

		Male	Female	Total
Reading Attitudes	CoEd	62.8	61.7	62.2
	Single Sex	60.7	61.1	60.9
Mathematics Attitudes	CoEd	29.2	30.4	29.8
	Single Sex	27.3	27.4	27.3
Social Studies Attitudes	CoEd	32.2	31.7	31.9
	Single Sex	32.5	32.6	32.6
Science Attitudes	CoEd	33.9	34.4	34.2
	Single Sex	36.3	35.3	35.9

Table 4.5
MANOVA Results for the Estes Attitude Scales

Source	Dependent Variable	df	Mean Square	F	η^2 p
Group	English	1	54.015	1.08	0.01
	Mathematics	1	171.68	9.37*	0.06
	History	1	12.127	1.1	0.01
	Science	1	81.924	2.93	0.02
Sex	English	1	3.917	0.08	0
	Mathematics	1	12.158	0.66	0
	History	1	1.087	0.1	0
	Science	1	1.82	0.07	0
Group by Sex	English	1	16.35	0.33	0
	Mathematics	1	9.292	0.51	0
	History	1	2.717	0.25	0
	Science	1	15.979	0.57	0

As shown in Tables 4.4 and 4.5, there is a significant effect on attitudes toward mathematics, with students in the coeducational school having a slightly higher mean. It is interesting to note that there are no gender effects, despite the widely discussed differences between males and females on reading and mathematics.

Section IV

Achievement

PSSA scores for the students in the two schools were analyzed for students in the third, fourth, fifth and sixth grades. Unlike the data described above, these data are cross-sectional. The mean PSSA scores in mathematics and reading by group, sex and grade are presented in Table 4.6.

Table 4.6
Means and Standard Deviations for PSSA Mathematics and Reading Scores

	Sex	Grade	Group	M	SD	Sex	Grade	Group	M	SD	
READING	Male	3	CE	1166	127	Female	3	CE	1217	120	
			SS	1174	136			SS	1190	98.8	
			Total	1170	127			Total	1205	110	
		4	CE	1016	161		4	CE	1093	146	
			SS	1187	149			SS	1224	223	
			Total	1131	171			Total	1155	195	
	5	CE	1005	129	5	CE	970	136			
		SS	1112	148		SS	1143	93.5			
		Total	1060	148		Total	1075	140			
	6	CE	1038	140	6	CE	1107	96			
		SS	1139	157		SS	1173	128			
		Total	1105	157		Total	1136	114			
	Total	CE	Total	CE	1048	148	Total	CE	CE	1101	149
				SS	1152	150			SS	1181	149
				Total	1109	157			Total	1141	154

Table 4.6 (Continued)
Means and Standard Deviations for PSSA Mathematics and Reading Scores

	Sex	Grade	Group	M	SD	Sex	Grade	Group	M	SD		
MATHEMATICS	Male	3	CE	1140	203	Female	3	CE	1119	173		
			SS	1191	120			SS	1092	93.1		
			Total	1163	168			Total	1107	141		
		4	CE	1121	210		4	CE	1206	114		
			SS	1283	168			SS	1211	157		
			Total	1230	195			Total	1209	134		
	5	CE	1149	203	5	CE	1102	139				
		SS	1238	153		SS	1262	116				
		Total	1195	182		Total	1199	147				
	6	CE	1202	222	6	CE	1292	114				
		SS	1302	157		SS	1265	163				
		Total	1269	184		Total	1280	136				
	Total	CE	Total	1152	204	Total	CE	Total	1184	151		
				SS	1266				158	SS	1215	147
				Total	1219				186	Total	1199	149

A three-way MANOVA with group, grade, and sex was conducted with the achievement data from both the PSSA mathematics and PSSA reading. The results of this three-way MANOVA are presented in Table 4.7. Graphs of the data for reading and mathematics are presented after the MANOVA table.

Table 4.7
Three-way MANOVA results for PSSA Scores

Source	Dependent Variable	df	Mean Square	F	η^2 p
Sex	READING	1	71682.5	3.55	0.02
	MATHEMATICS	1	5588.84	0.22	0
Grade	READING	3	160117	7.93**	0.09
	MATHEMATICS	3	146270	5.77**	0.06
Group	READING	1	486531	24.11**	0.09
	MATHEMATICS	1	238232	9.40**	0.03
Sex by Grade	READING	3	12140.6	0.6	0
	MATHEMATICS	3	17065.8	0.67	0
Sex by Group	READING	1	1814.15	0.09	0
	MATHEMATICS	1	76661.8	3.02	0.01
Grade by Group	READING	3	70878.2	3.51**	0.04
	MATHEMATICS	3	36273.7	1.43	0.01
Sex by Grade by Group	READING	3	10804.9	0.53	0
	MATHEMATICS	3	44062.4	1.73	0.02

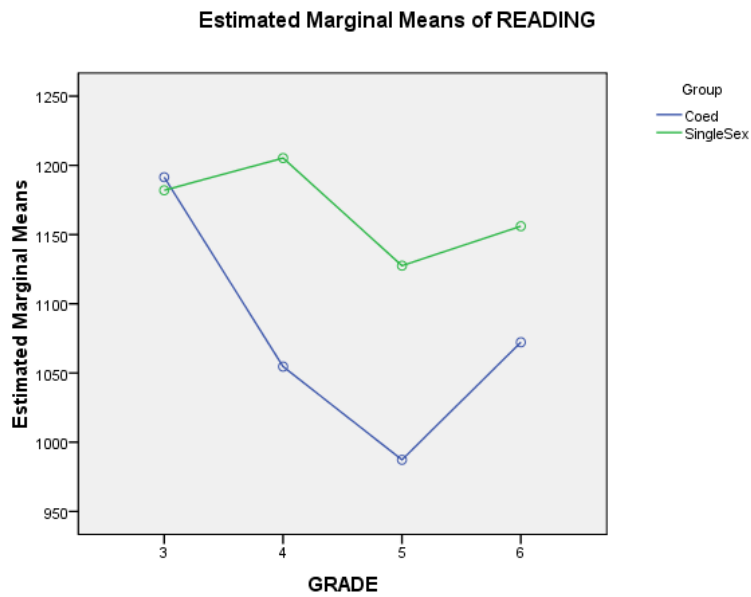


Figure 4.1. Estimated marginal means of PSSA reading assessment for coeducational and single-sex students in grades three through six.

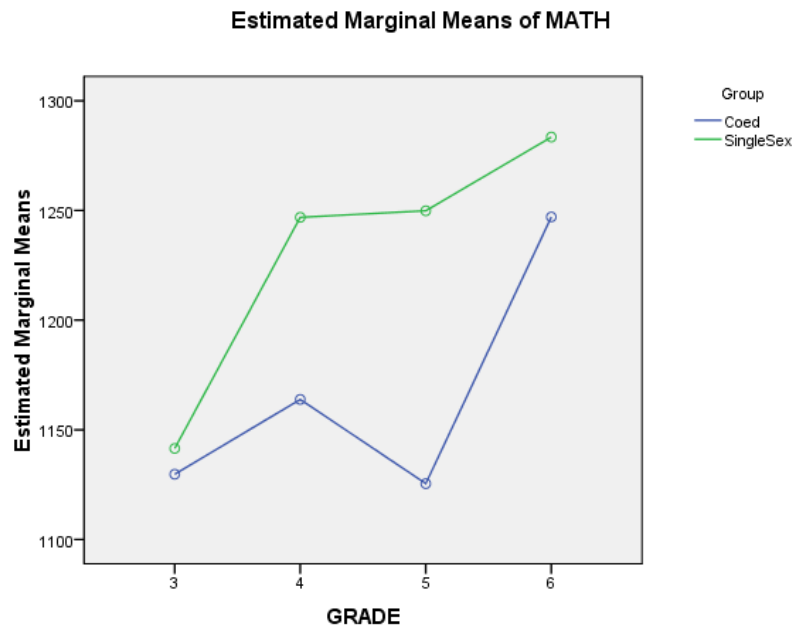


Figure 4.2. Estimated marginal means of PSSA mathematics assessment for coeducational and single-sex students in grades three through six.

As demonstrated in the two graphs, there are minimal differences in the beginning between the two groups in third grade, but noticeable differences in favor of the students in the single-sex schools from that point onward.

Number of Years in Single-sex Schools

An analysis was performed to ascertain if the number of years a student had participated in single-sex education affected the student's attitudes and achievement. To make this analysis more complete, gender was added to the design to see if the possible effects differed by the student's gender. There was no effect for attitudes. There was, however, a significant effect for achievement. The means for reading and mathematics are contained in Table 4.8 and the MANOVA results are contained in Table 4.9.

As shown in Table 4.8 and 4.9, the mathematical achievement of students in single-sex classes increases the longer they are in this type of setting.

Table 4.8
Means for Reading and Mathematics by Years in Single-sex Schools and Gender

	Sex	Years in SS	M	SD		Sex	Years in SS	M	SD
READING	Male	1	1090	139.1	MATH	Male	1	1162.6	123.7
		2	1183	143.3			2	1305.4	151.9
		3	1162.5	161.9			3	1313.1	153.7
		Total	1151.8	149.8			Total	1265.7	157.5
	Female	1	1157.9	189.9	Female	1	1147.6	147.3	
		2	1188.5	144.4		2	1218.9	136	
		3	1196.2	136.8		3	1285.9	173.8	
		Total	1183.7	151		Total	1214.8	147.1	
	Total	1	1113.9	159.5	Total	1	1157.3	130.5	
		2	1185.8	143		2	1260.5	149.4	
		3	1174.6	151.3		3	1303.3	158.1	
		Total	1166.1	150.6		Total	1242.8	154.4	

Table 4.9
MANOVA Results for Mathematics and Reading

Source	Dependent Variable	df	Mean Square	F	η^2 p
Sex	READING	1	32513.39	1.46	0.011
	MATHEMATICS	1	46905.72	2.25	0.017
Years In	READING	2	43720.88	1.96	0.029
	MATHEMATICS	2	171147.6	8.21*	0.111
Sex by Years In	READING	2	11148.53	0.5	0.008
	MATHEMATICS	2	17891.33	0.85	0.013

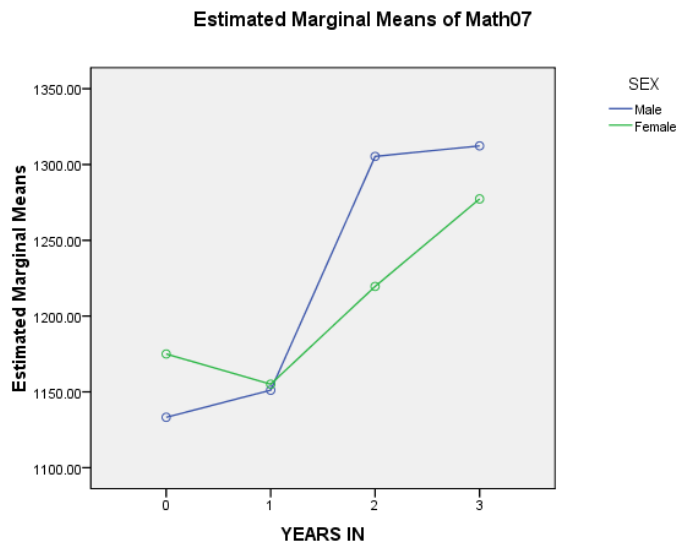


Figure 4.3. Estimated marginal means of PSSA mathematics assessment over time for students in single-sex classes.

Section V

Teacher Interviews

To ascertain the teachers' perceptions of the strengths and weaknesses of single-sex education a purposeful sample of teachers were asked general and specific questions about their experiences as teachers in single-sex environments. Table 4.8 contains a description of these teachers.

Table 4.10
Teachers for Interview

Name	Grade	Gender Taught
Ann	3	boys
Helen	3	girls
Mark	4	boys
Sally	4	girls
Steve	5	boys
Mary	5	girls
Joan	6	boys
Beth	6	girls

Throughout the interviews, teachers were encouraged to elaborate or discuss related topics or issues. Categories correlating to the research questions (What are the teachers' perceptions of the strengths and weaknesses of single-sex education? Are these perceptions affected by teacher training? Are these perceptions affected by the grade level taught? Are these perceptions affected by the specific gender taught?) were established.

Strengths and Weaknesses of Single-Sex Education

When teachers were asked how teaching in a single-sex environment has changed their instructional preparation and delivery most (8 of 10) spoke of changes in behavior management techniques rather than instructional practices. A few (3 of 10) of the teachers told the interviewer about making some changes to instructional delivery in terms of switching to more hands-on strategies especially for mathematics and science instruction. All teachers made comments about competition whether it was the elimination of competition in the girls' classes or an emphasis on it in the boys' classes.

Sally: Girls are not as much discipline problems. They want to learn. (They) like being seen as smart. (I spend) 90% of time teaching and only 10% on discipline.

Mark: Classroom management is stricter with boys but my teaching techniques are the same.

Sally: Girls are moving forward with science. They like the hands on stuff we can do now.

Joan: I do less writing and more hands-on in mathematics. I allow the boys to move around a lot more.

Mary: For the most part, girls don't have many fights. There is bonding present without all the competitiveness the boys have

Steve: Competitiveness at this age is positive for boys. It builds a level of fraternity.

Teachers were also asked how the single-sex environment has changed the performance of their students. Teachers of girls felt that girls were faring well in terms of

focus and self esteem whereas teachers of boys commented on a lack of discipline but better focus.

Beth: The girls are more focused, more motivated. There are no boys to perform for. They don't have to worry about how they act anymore.

Joan: They (boys) are a lot more focused and more goal oriented. There is a lot of competition between each other.

Teacher Training

To uncover the amount of preparedness teachers in these single-sex classes have they were asked about the type and amount of professional development they participated in since the inception of the single-sex program at their school. Overwhelmingly the response from all interviewees was that professional development lacked in both content and consistency. Teachers that were not part of the school when the single-sex program began felt as though they missed crucial professional development that occurred before they were part of the faculty. A confidential informant at the school allowed me to view the list of professional development opportunities offered to teachers of Successful Schools. They had many sessions on Saturdays and in the summer with various experts such as Leonard Sax and Joann Deak. There were also book study groups focused on the work of Leonard Sax and Michael Gurian. Additionally, a weeklong summer course on gender issues in education was offered in partnership with a local College of Education.

Ann: We had brain research professional development with Dr. Deak the summer before we started this.

Mark: Different way to teach, different environments and styles of learning right as we got started. That was like four or five years ago.

Joan: I started after the school went gender separate. I read some about it on my own. More professional development is needed. People had some before I came but it sounds like it was all theory. They should have more professional development on best practices.

Grade Level and Gender Taught

During the interviews, teachers were also asked about their current teaching assignment. It came to my attention during my time working with Successful Schools that teachers were often randomly assigned to grades and genders when the single-sex program was initiated. Several years into the program, there seems to be more matching of teachers with their preferred grade and gender assignment. Nine of the teachers interviewed said they were in a grade and gender assignment that suited them and their teaching style. There was one teacher who voiced a different opinion of her assignment at the school and of the single-sex setting in general.

Sally: I like working with the girls. You can talk to them differently. It is a more homey atmosphere.

Mark: I like it. I don't know if the boys have changed but I do like it.

Helen: I would rather be teaching a mixed class. Things really haven't changed. The administration has not given us best practices for boys. It is not such a good idea for younger grades because of the socialization needs. A much better time would be middle and high school when girls feel intimidated or don't try as much in the presence of boys.

Section VI

Student Focus Groups

To understand how students perceive the single-sex educational setting that they are participating in, focus groups of students were established. During these groups students were asked guiding questions but were encouraged to talk about how school is different for them as part of this program. The purpose of the focus groups was to address the following research questions: What are the students' perceptions of the strengths and weaknesses of single-sex education? Do the students' perceptions affect their achievement? Categories correlating to these research questions were formed when analyzing information garnered from the focus groups. For each category, both boys' and girls' perceptions will be presented across different grade levels to help answer the following research questions: Are the perceptions of the boys different from the perceptions of the girls? Are the students' perceptions related to grade level?

Strengths and Weaknesses of Single-Sex Education

Students were asked a general impression question to access their perceptions on how school is now that they are enrolled in single-sex classes. The students participating in the focus groups were all in favor of the single-sex setting. There was no variation across grade levels.

Girl (Sixth Grade): You feel more comfortable talking in class about anything and answering questions.

Girl (Fourth Grade): The classroom is more quiet. Girls get along better. The boys misbehave. The boys were annoying with distractions and we learned less.

Girl (Third Grade): It's more fun. We get free time because we stay on task and get work done. More fun at school than at home.

Girl (Fifth Grade): All girls is better. Volunteer more. If you need to fix your shirt it's okay because we're all girls.

Boy (Fifth Grade): You feel uncomfortable around girls. Able to focus on work instead of girls. You pay attention because you don't have girls distracting you.

Boy (Fourth Grade): You can play rough. There are more fights because we play a lot. It's more fun just boys.

Boy (Third Grade): It's better. Easier for boys to get along.

Boy (Sixth Grade): Boys are more focused when the girls (are) not there.

Achievement

During the focus groups, students were asked to talk about their feeling towards particular school subjects. All boys and girls across the grade levels enjoy reading, mathematics and science. They like the presentation of material and the activities they do. Students were also asked to talk about how being enrolled in a single-sex classroom has affected their grades.

Girl (Sixth Grade): Subjects don't seem so complicated. We can focus more and learn more.

Girl (Third Grade): I like reading, science and mathematics in that order.

Girl (Fourth Grade): I like the mathematics tools. Mathematics is my favorite. I understand it better.

Boy (Sixth Grade): I like all three subjects (reading, mathematics, science). I get to work independently.

Boy (Fourth Grade): I like mathematics and reading. Science is okay. The teacher explaining makes it easier to learn.

Boy (Third Grade): Mathematics is good. We do activities to help us learn the things we need to know.

Across the grade levels, girls were overwhelmingly satisfied with their academic performance. The boys were not as confident in this area. Older boys (fifth and sixth grade) acknowledged that their misbehavior is getting in the way of academic achievement.

Girl (Sixth Grade): Teachers talk about girls stuff and about how we should try to do our best and we feel comfortable and we work harder.

Girl (Fifth Grade): I have A's and B's now. I used to get C's, D's and F's.

Girl (Fourth Grade): I scored advanced and proficient because of help from my teacher and group work.

Boy (Sixth Grade): Grades are worse mostly because of just boys. Boys like to play too much and it's hard to get work done. The teacher stops too much to tell boys to stop playing.

Boy (Fifth Grade): Boys talk too much and play around. Grades are bad.

Boy (Fourth Grade): I get better grades because I focus more on work.

Boy (Third Grade): I listen to the teacher and pay attention to what I am supposed to do.

Summary

Presented next is a summary of findings from this study as they are related to the original research questions.

1. Does single-sex education have an impact on attitudes toward school and achievement for students in grades three through six?
 - Students in single-sex classes had statistically higher means than students in coeducational settings on the School Engagement Survey sections of Positive Self Perception, Positive Teacher Belief, and Positive School Environment.
 - Students in coeducational settings had statistically higher means on the Estes Attitudes Scales for the subject of mathematics.
 - Students who were enrolled in single-sex classes for more than one year had higher scores on standardized mathematics tests.
 - Although single-sex and coeducational students start at approximately the same level for both reading and math, the single-sex students consistently score higher than their coeducational counterparts.
2. Is the impact of single-sex education different for boys as contrasted to girls?
 - There were no significant gender differences on any of the measures of attitudes or achievement.
3. What are the teachers' perceptions of the strengths and weaknesses of single-sex education? Are these perceptions affected by teacher training, grade level taught, and specific gender taught?
 - Teachers did not drastically change their instructional approach after being assigned to a single-sex classroom but they did change their approach to behavior management.

- Teachers do not participate in quality, ongoing professional development to support their practice as teachers of a single-sex class.
4. What are the students' perceptions of the strengths and weaknesses of single-sex education? Are these perceptions different for boys and girls and are they related to grade level?
- Both boys and girls seem to enjoy the attention they receive in single-sex classes. Boys and girls also expressed a feeling of comfort in the single-sex setting.
 - Boys and girls alike expressed enjoyment of all school subjects including mathematics and science.
 - Girls and younger boys perceived themselves as being much more academically successful in the single-sex classroom.
 - Boys in grades five and six perceived themselves as failing academically and they blame the bad behavior exhibited in their all boys' classes.

CHAPTER 5

DISCUSSION

Introduction

In the January 2, 2009 edition of *The Boston Globe*, a story about single-sex educational opportunities in public schools was printed. Presently, Boston public school officials are trying to combat a state law in order to open single-sex public schools. This article illuminates the need for more research in this area.

Detroit has been at the forefront of a growing but controversial movement that aims to boost student achievement by splitting the sexes into different schools. Now Boston officials are fighting to open the state's first single-gender public schools in more than a generation. Proponents say all-boy or all-girl schools allow some students to better focus on learning without the distraction of the opposite sex, enabling them to excel in areas where a gender gap in achievement typically exists. National standardized tests have long shown girls lagging in mathematics and science, and boys in reading and writing. The American Civil Liberties Union derides the return of single-gender education - aided by a recent relaxation of federal regulations - as a misguided fad that can lead to an inferior education for all students, especially if schools adopt programs that reinforce gender stereotypes. ACLU officials say it also could represent a major setback for female students, who waged a legal battle in the 1960s and 1970s to gain access to elite boys' schools. Those battles ultimately led to the end of single-gender public schools across the country and even prompted some elite private schools to go coed. ("In Detroit", 2009)

The research I conducted is just the beginning of what needs to be a large scale research effort of all public schools employing single-sex educational settings as a reform effort. It is also clear from this article and from my personal experience with the topic that it is particularly important to conduct this research in urban public schools. Until there are

data to either support or refute the success of single-sex public schools, the discourse will remain in the quagmire of legal issues and personal opinions.

Research Questions

On a small scale, this research will begin to remedy the lack of current, scholarly research on single-sex public education. I attempted to quantitatively answer two major questions in my research. These questions are: 1) Does single-sex education have an impact on attitudes and achievement toward school for students in grades three through six? and 2) Is the impact of single-sex education different for boys as contrasted to girls? I also attempted to answer two major questions qualitatively in this research. These questions are: 1) What are the teachers' perceptions of the strengths and weaknesses of single-sex education? and 2) What are the students' perceptions of the strengths and weaknesses of single-sex education?

The attitudes of students in the single-sex classes about school in general differed significantly from those of their coeducational counterparts. Statistically significant higher means on the School Engagement Survey were found for the students in the single-sex classes in the areas of Positive Self Perception ($M = 51$, $SD = 9.6$), Positive Teacher Beliefs ($M = 51.2$, $SD = 8.05$), and Positive School Environment ($M = 52.1$, $SD = 9.49$). Students in single-sex classes considered themselves smart with the potential to go to college, get a good job and have a successful future. These students felt that their teachers also believed that they could go to college and be successful. Single-sex students viewed their school as a good place to study. These students cared if they got in trouble at school.

Analysis of the data collected with the Estes Attitudes Scales on the students' feelings about particular school subjects were somewhat surprising. Students in the coeducational schools had slightly higher means in their attitudes about mathematics ($M = 29.8, SD = 4.4$) as compared to the students in single-sex classes ($M = 27.3, SD = 4.3$). This finding itself is not what is surprising in this analysis. It is the lack of significance supporting what has become a popular belief that boys prefer mathematics and science and girls prefer language based subjects such as reading and social studies. There were no significant differences between boys and girls in their attitudes towards school subjects.

The achievement data from the state standardized test, the PSSA, were analyzed for both mathematics and reading for students in both single-sex and coeducational settings for grades three through six. There were no statistically significant differences in achievement between students in single-sex classes and students in a coeducational setting for this sample. However, when presented in a chart (see Figure 4.1 and Figure 4.2), it is clear that although single-sex students and coeducational students started at generally the same level in third grade the single-sex students stay clearly and consistently above their coeducational counterparts. There was also a significant effect of the amount of time spent in a single-sex class on achievement in mathematics. The longer the students stay in single-sex classes, the higher they score on the PSSA in mathematics. Relating this finding to those findings about students' feelings toward school in a single-sex environment led to the assumption that if students have positive feelings about themselves, their teachers and their school over a period of time their achievement will eventually increase.

Teachers interviewed for this research provided much needed insight into the experiences of teachers in public single-sex settings. With the exception of one teacher, the perceptions of teachers concerning teaching in a single-sex environment were generally positive yet cause for concern. Most teachers had not changed their instructional delivery considerably after switching to a single-sex class. What the teachers did change was their approach to behavior management – more strict for boys, more freedom for girls. Some teachers did not perceive there to be any difference in their students compared to when they were in coeducational classes. While the teachers might enjoy this teaching assignment more, they felt there was no clear evidence it was helping. One teacher found the whole idea of single-sex education misplaced in an elementary school. She felt this initiative belongs only in middle and high schools where hormones and social pressures come into play.

During the interviews teachers were asked what kind of professional development they had received related to instructional strategies for single-sex classes. While there was some professional development provided to the teachers at the onset of the initiative, there has been very limited follow up. It is this scarcity of professional development that causes concern as more and more public school districts open single-sex classes and schools. Without research on the success or failure of single-sex opportunities in the public setting, good, research-based, quality professional development will not be developed. As it stands, teachers are left to devise their own ideas and strategies based on the plethora of popular literature currently flooding the market. Much of this literature is based on opinion and personal experience, not scholarly research.

The students that participated in the focus groups had generally positive perceptions of their school experience since participating in single-sex classes. Both boys and girls expressed feelings of comfort being in a same sex environment. Also, both boys and girls seemed to be equally interested in all school subjects. These perceptions held true across grade levels. When asked about their academic achievement since enrolling in a single-sex class, girls across all grade levels felt they were performing far better now as compared to when they were in a coeducational class. This was not true for boys across grade levels. The boys from third and fourth grade perceived themselves as doing better in the single-sex class because they are able to pay attention and focus better. The older boys, grades five and six, blame their lack of good grades on the abundance of behavior problems present in the all -boy setting.

Limitations

This study compared students in single-sex classrooms enrolled in schools managed by an Educational Management Organization (EMO) with students in coeducational classes enrolled in schools solely under the auspices of the Philadelphia School District. Although the EMO schools are still part of this larger district, they are managed differently. EMO schools have the discretion to change the curriculum and/or use different instructional materials than their school district counterparts. Successful Schools uses different instructional materials but still follows the same curriculum as the School District of Philadelphia. Other EMO's operating in the Philadelphia School District have selected to use different instructional materials and different curriculum than the school district. This difference makes a comparison between Successful Schools and schools managed by another EMO less desirable. The decision to compare the

Successful Schools to a Philadelphia School District school allows for comparison of students using the same curriculum.

A large majority of the students who participated in the study are African American, living in poverty, and enrolled in one of the largest urban school districts in the country. Results of this research may not be generalizable to students living in suburbia where the effects of poverty or large school districts are non-existing. While I am sure that the suburban school districts have issues of their own, it is the urban schools with their dismal history of continued failure that are in urgent need of attention. It is my belief that the results of this study are generalizable to other urban schools in crisis.

Future Research

Through my experience of conducting this research in the district in which I am employed, it came to my attention that there are many schools in the district quietly experimenting with single-sex classes. The research I conducted focused on a very small subset of these schools. It would be worthwhile to replicate this study on a much larger scale including all schools in the district that have employed single-sex classrooms as a means of school reform. This would enable the research to encompass a larger sample size that spans across more grades. Additionally, collecting data from students in single-sex classes across the district a more diverse sample may be achieved.

Reflections

Throughout the duration of this project, more and more headlines like the one quoted in the beginning of this chapter kept popping up in major newspapers and news magazines across the country. Having such a public eye on the topic I was researching added an extra level of responsibility. Currently, people are waiting for the results of

studies just like this one to either confirm or deny their opinions about single-sex settings in the public schools of our country. It seems to me that we should be pointing more students towards this topic to begin to build the body of research that will eventually shape what many are calling a fad. Certainly, more educational research in this area should be federally funded. Clearly there is enough legal controversy to warrant the attention of top researchers at major universities. With the majority of the research reviewed by the United States Department of Education in 2005 being from Catholic, private or international schools, the lack of research in the public sector could not be more apparent.

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APPENDIX A

ESTES ATTITUTDES SCALE – REVISED

ESTES ATTITUDE SCALES (REVISED)

DIRECTIONS: These scales measure how you feel about courses you took in school. On the front and back of this sheet are statements about school subjects. Read each statement and decide how you feel about it. Rate each statement on a scale of 1 to 5 as shown from 5 meaning "strongly agree" to 1 meaning "strongly disagree." Show your answers by putting an X in the proper box. Please be as honest as possible in rating each statement.

1. Students should be required to take English every year.
2. Studying science is a waste of time.
3. Work in English class helps students do better work in other classes.
4. Science courses are worth the time and effort they take.
5. Exploring outer space may prove useful to mankind.
6. Studying math in school is a good idea.
7. People who like math are often weird.
8. Reading is rewarding to me.
9. Working math problems is fun, like solving a puzzle.
10. Studying the history of different peoples of the world helps us understand them.
11. The study of history is interesting.
12. Many good hobbies come from the study of science.
13. The study of English is fun.
14. A student can often use what he or she learns in a history course.
15. It is impossible to understand math.
16. History has little to offer the average student.
17. Working math problems is a waste of time.
18. A student would profit from taking math every year.
19. There are many books which I hope to read.
20. Science classes are usually fun.
21. Studying history in college was a good choice.
22. Much of what is taught in history is not important.

	Strongly Agree	Agree	Cannot Decide	Disagree	Strongly Disagree
1	5	4	3	2	1
2	5	4	3	2	1
3	5	4	3	2	1
4	5	4	3	2	1
5	5	4	3	2	1
6	5	4	3	2	1
7	5	4	3	2	1
8	5	4	3	2	1
9	5	4	3	2	1
10	5	4	3	2	1
11	5	4	3	2	1
12	5	4	3	2	1
13	5	4	3	2	1
14	5	4	3	2	1
15	5	4	3	2	1
16	5	4	3	2	1
17	5	4	3	2	1
18	5	4	3	2	1
19	5	4	3	2	1
20	5	4	3	2	1
21	5	4	3	2	1
22	5	4	3	2	1

23. Almost any subject is better than English.
24. Most books are too long and dull.
25. English courses are some of the worst courses in school.
26. Math is boring.
27. Time spent in English class is time well spent.
28. Almost any course is better than a history course.
29. English class is too short.
30. A deeper love of nature comes from the study of science.
31. English is boring.
32. Books aren't usually good enough to finish.
33. Reading is a good way to spend spare time.
34. Science teaches people to think.
35. Knowledge of the past helps us understand the present.
36. Books make good presents.
37. Watching TV is better than reading.
38. Man profits little from the study of the past.
39. Reading is dull.
40. English is one class I could do without.
41. Science is interesting.
42. It is easy to get tired of math.
43. The study of English is a waste of time.
44. Math is easy.
45. Reading becomes boring after about an hour.
46. Spending money on books is a waste of good money.
47. It is fun to figure out how things work.
48. The study of history is dull.
49. Without math courses, school would have been a better place.
50. An understanding of how the earth changes helps make a better world.

	Strongly Agree	Agree	Cannot Decide	Disagree	Strongly Disagree
23	5	4	3	2	1
24	5	4	3	2	1
25	5	4	3	2	1
26	5	4	3	2	1
27	5	4	3	2	1
28	5	4	3	2	1
29	5	4	3	2	1
30	5	4	3	2	1
31	5	4	3	2	1
32	5	4	3	2	1
33	5	4	3	2	1
34	5	4	3	2	1
35	5	4	3	2	1
36	5	4	3	2	1
37	5	4	3	2	1
38	5	4	3	2	1
39	5	4	3	2	1
40	5	4	3	2	1
41	5	4	3	2	1
42	5	4	3	2	1
43	5	4	3	2	1
44	5	4	3	2	1
45	5	4	3	2	1
46	5	4	3	2	1
47	5	4	3	2	1
48	5	4	3	2	1
49	5	4	3	2	1
50	5	4	3	2	1

APPENDIX B
SCHOOL ENGAGEMENT SURVEY

School Engagement Survey

Think carefully and fill in the answer that best fits you.

4 = Strongly Agree 3 = Agree 2 = Disagree 1 = Strongly Disagree

	4	3	2	1
1. My school is a good place to study.....				
2. I ask my friends to come to my house to study.....				
3. I believe I have a good future.....				
4. I like to study.....				
5. Getting a school education is NOT for people like me.....				
6. Sometimes I do things at school that I know will get me in trouble...				
7. School is a boring place to be.....				
8. I skip school when I think I can get away with it.....				
9. Other kids make fun of me because I am smart.....				
10. I believe my teachers are glad when I skip school.....				
11. Most people consider me to be a good student.....				
12. I only go to school to hook-up with my friends.....				
13. I sometimes study with my friends.....				
14. My teachers believe I am smart enough to go to college.....				
15. I like it when I cause trouble in school and don't get caught.....				
16. I believe I will get a good job someday.....				
17. Doing well in school is not important to me.....				
18. I think that going to school 3 days a week is enough.....				
19. I don't care if I get in trouble at school.....				
20. My friends ask me to study with them.....				
21. My teachers believe in me.....				
22. Getting an education is not for me.....				
23. My teachers believe that I have a good future.....				
24. I believe school will help me to become a success someday.....				
25. I feel good when I learn things that will help me get a good job.....				

APPENDIX C
STUDENT FOCUS GROUP
OPEN-ENDED QUESTIONS

Student Focus Groups Open-Ended Questions

How is school different now that there are only boys (or girls) in your class?

How has this changed how you feel about school?

How do you feel about subjects like reading, math and science?

How do you think this change has affected your grades?

APPENDIX D
TEACHER INTERVIEW
GUIDED QUESTIONS

Teacher Interview Guiding Questions

What is it like teaching in a single-sex classroom in a public school?

What kind of professional development did you participate in before teaching in a single sex educational setting?

Are you teaching your preferred grade level and gender?

How has your planning for or delivery of instruction changed since being assigned to a single sex educational setting?

How has the single sex educational setting changed the performance, behavior, and motivation of the students?