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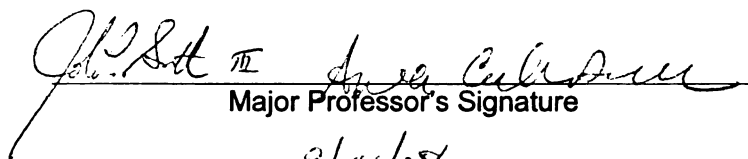
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**SINGLE-SEX MIDDLE SCHOOL SCIENCE CLASSROOMS:
SEPARATE AND EQUAL?**

By

Howard M. Glasser

A DISSERTATION

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ABSTRACT

SINGLE-SEX MIDDLE SCHOOL SCIENCE CLASSROOMS: SEPARATE AND EQUAL?

By

Howard M. Glasser

The U.S. Department of Education's amended regulations to Title IX have attempted to expand the circumstances in which single-sex classes are permissible in public schools. This ethnographic study uses grounded theory to investigate aspects of one single-sex offering at a public, coeducational middle school. Applying elements of postmodern, queer, and sociocultural lenses, it examines the perspectives for this offering, shedding insight into the cultures of two single-sex classrooms and what it meant to be a boy or girl in this setting. Additionally, it focuses attention on the all-boy and all-girl science classes that were taught by the same teacher and examines what it meant to learn science as boys and girls in this program.

Although participants supplied financial, socio-emotional, and academic reasons for these classes, the initial motivation for these classes stemmed from the teachers' desire to curb the amount of sex talk and related behaviors that were exhibited in their classrooms. Through these conversations and classroom events, the girls were constructed as idealized students, academically and behaviorally, who needed to be protected from boys' behaviors – both boys' dominating classroom behaviors and aggressive (hetero)sexual behaviors. Conversely, boys were constructed as needing help both academically and behaviorally, but in the specific discipline of science boys were identified as the sex that was more interested in the content and gained greater exposure to skills that could assist them in future science courses and careers.

Overall, boys and girls, and the culture of their two classrooms, were regularly defined relative to each other and efforts were made to maintain these constructed differences. As a result, the classes and students were hierarchically ranked in ways that often pitted one sex of students, or the entire class, as better or worse than the other. The theory emerging from this study is that single-sex policies arise and survive through an endorsement of exclusion, which perpetuates the construction of differences between the sexes. These single-sex settings construct identities and cultures that could have substantial effects on students' understanding of themselves and other students, their future academic and professional pursuits, and their relationships with other people.

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CHAPTER 1: INTRODUCTION

Is it better to teach boys and girls separately or together in school? Although there has been little conclusive evidence about the value of single-sex offerings relative to coeducational offerings, answering this question has grown more urgent given that recent amended regulations to Title IX have made it easier for public schools to offer more sex-segregated opportunities (Arms, 2007; Salomone, 2006; U.S. Department of Education, 2005a, 2006a). In fact, despite the U.S. Department of Education's stated goal for teachers and schools to ground their practice in "scientifically based research,"¹ few studies of these settings have met NCLB standards for rigor therefore making it difficult to assess the benefits or drawbacks of these settings. This dissertation investigates one of these single-sex offerings in order to contribute to discussions surrounding these environments.

It does not unequivocally answer which setting is better for students nor did it aim to answer such a question. Neither setting, in and of itself, will guarantee specific changes in students and schools without other elements such as support from teachers and parents, physical resources, and professional development (Datnow & Hubbard, 2002; Martino, Mills, & Lingard, 2005; Riordan, 2002). Additionally, the meaning of "better" depends on the people or groups asking the question and the outcome(s) they wish to explore. Better for whom? Teachers? Students? Better in terms of what? Academic performance? Behavioral issues? Based on what? Standardized tests? Class grades? Students' tardiness? The number of office referrals?

¹ As noted in the No Child Left Behind [NCLB] Act of 2001 (NCLB, 2002).

Clearly, this dissertation cannot address all possible variables and outcomes that might impact the effectiveness of a given program. Instead, it concentrates on a detailed investigation of one specific single-sex offering at a public, coeducational middle school located in Michigan. It examines the perspectives for this offering, shedding insight into the culture of single-sex education that was developed in this one middle school and what it meant to be a boy or girl in this setting.

Additionally, this dissertation focuses much attention on the all-boy and all-girl science classes that were taught by the same teacher at this school. This investigation examined what it meant to learn science as boys and girls in this program. Science was selected because it can serve as a gateway to many lucrative jobs and professional opportunities, but males tend to outperform females in school science, take more science classes, and are more likely to obtain careers in science (Fennema, 1990; Freeman, 2004; National Academies, 2007). These differences in performance and interest have been noted in adolescence and grow larger as students move through educational systems (Freeman, 2004). Therefore, although some of the seeds for these differences might have been planted earlier in students' lives, the selected site was a middle school because that period in students' schooling is when these differences become pronounced and includes a critical time in terms of their understanding of what it means to be a man or woman (e.g., Campbell, Voelkl, & Donohue, 2000; Erikson, 1968; Zittleman, 2007).

Research Questions

Through this study, I explored the following research questions:

1. What perspectives for single-sex education populate one public middle school with such a program?
2. What do the cultures of two single-sex classrooms in this one middle school say about who boys and girls are and what it means to learn science as boys and girls?

Before discussing the methods, data, and analyses for investigating these questions, it is important to provide some background information regarding single-sex education, reasons people support and oppose expanding single-sex educational opportunities, research studies that have investigated these offerings, different outcomes reported for boys and girls in science education, and reasons why the study focused on a middle school and adolescents. Following these sections, I will outline the conceptual framework through which this work is seen and will define several terms that are contained in my research questions and central to this work.

Background

A Brief History of Single-Sex and Coeducational Schooling in the United States

Many Americans today view coeducation as an unquestioned aspect of schooling (Tyack & Hansot, 1990); however, anthropological research suggests that almost all “primitive” societies taught males and females separately and therefore coeducation should not be viewed as more “natural” than single-sex education (Mael, 1998). In fact, many elementary and secondary schools in the United States initially taught men and women separately. Coeducation was ultimately adopted by many schools because of financial concerns, not because of scientifically-based research that supported this move

or beliefs in democracy or equity between the sexes (Riordan, 1990).

By the late 1800s, coeducation was almost universal in American elementary and secondary public schools but doctors and psychologists reported that coeducation in secondary schools adversely affected girls' health, and others expressed concern that the urbanization and increased employment of women contributed to increased divorce rates and child mortality rates (Riordan, 2002; Tyack & Hansot, 1990). As a result, many people supported teaching boys and girls separately, within these coeducational schools, creating classes to teach girls how to be better homemakers and constructing other unique classes just for them (Tyack & Hansot, 1990). Therefore, although separate schools for boys and girls were no longer economically feasible, having these students in the same building did not mean they were introduced to similar curricula. Instead, they typically followed sex-specific tracks such that boys would often take shop classes while girls would enroll in home economics (Arms, 2007).

This segregated schooling continued through the start of the Civil Rights Movement, which partially ignited and influenced the Women's Movement of the 1960s and 1970s. Such social and legal movements during this period, including feminists' more vocalized reportings of sex bias, changed many people's thoughts on these issues and altered numerous policies such that boys and girls now take similar classes in many public American schools. Similar to legal challenges that outlawed institutionalized segregation of racial and ethnic minorities, such as *Brown v. Board of Education* (1954) and the Civil Rights Act (1964)², Title IX of the Educational Amendments (1972) prohibited discrimination in education on the basis of sex. This federal law states that,

“No person in the United States shall, on the basis of sex, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any education program or activity receiving federal financial assistance” (Title IX of the Education Amendments of 1972). It only allowed the sexes to be segregated in specific instances, such as for physical education classes when the sports involved bodily contact, classes or portions of classes that dealt with human sexuality, and remedial or affirmative activities that aimed to counteract sex discrimination (U.S. Department of Education, 2005).

Since then, more research and discussion has arisen surrounding girls’ and boys’ schooling experiences, and different outcomes they have experienced (e.g., American Association of University Women Educational Foundation [AAUW], 1992, Foster, Kimmel, & Skelton, 2001; Sadker & Sadker, 1994). Some authors have articulated that a “boy crisis” is afoot as evidenced by boys’ declining achievement relative to girls or the rise in behavioral concerns regarding boys (Foster, Kimmel, & Skelton, 2001; Sommers, 2000). Other reports have claimed that a “shortchanging” of girls is taking place such that boys receive more attention from teachers and girls continue to experience bias and barriers that hinder them (e.g., AAUW, 1992). Still other papers have argued that neither sex as a whole is being disadvantaged as both boys and girls are performing better today than they ever have (AAUW, 2008; Mead, 2006). Regardless of how people interpret these varied reports and commentaries, many politicians, policy makers, administrators, and teachers have pushed to change educational policies and laws in hopes of enhancing the schooling experienced by girls, boys, or both.

² Title VI of the Civil Rights Act of 1964 prohibited discrimination in programs that received federal assistance, including education programs, on the basis of race, color, and national origin, but it did not prohibit discrimination on the basis of sex.

All of this attention influenced changes to U.S. educational policy such that the No Child Left Behind Act of 2001 stated, “Funds made available to local educational agencies under section 5112 shall be used for innovative assistance programs, which may include...programs to provide same-gender schools and classrooms (consistent with applicable law)” (NCLB, 2002). The parenthetical phrase “consistent with applicable law,” implicitly acknowledged that Title IX restricted the instances in which “same-gender schools and classrooms” could exist. Subsequent amended regulations to Title IX, which took effect November 24, 2006, made it easier for schools to offer single-sex educational offerings (U.S. Department of Education, 2006a). In the press release that discussed these amended regulations, U.S. Secretary of Education Margaret Spellings wrote that single-gender classes can be created as long as they are “substantially related to the achievement of an important objective such as improving the educational achievement of students, providing diverse educational opportunities or meeting the particular, identified needs of students” (U.S. Department of Education, 2006)³.

The regulations require that student enrollment in any single-sex class must be voluntary and schools must provide a “substantially equal” coeducational class, or a single-sex class to students of the excluded sex, in the same subject. Although the law defines “substantially equal factors”⁴, it is unclear how these factors would be assessed and could satisfy people who are concerned that equality is, or is not, being achieved.

³ Similar state laws, such as Senate Bill 1296 in Michigan, have expanded the circumstances in which single-sex classes can be allowed in public schools.

⁴ “Factors the Department will consider, either individually or in the aggregate as appropriate, in determining whether classes or extracurricular activities are substantially equal include, but are not limited to, the following: the policies and criteria of admission, the educational benefits provided, including the quality, range, and content of curriculum and other services and the quality and availability of books, instructional materials, and technology, the qualifications of faculty and staff, geographic accessibility, the quality, accessibility, and availability of facilities and resources provided to the class, and intangible features, such as reputation of faculty” (U.S. Department of Education, 2006a, p. 62543).

The U.S. Department of Education (2006a) noted that some commentators raised this concern that the law did not include stringent safeguards or review procedures to ensure that girls and boys in these settings received equal educations and also that some commentators were concerned that the phrase “substantially equal” was too vague. Additionally, people recommended that the Department postpone amending the regulations until pilot projects and more research could be conducted on the effectiveness of single-sex education (U.S. Department of Education, 2006a)⁵. The Department of Education acknowledged that there was not much research supporting the educational benefits of these offerings (U.S. Department of Education, 2005a), and their endorsing of these amended regulations seem to contradict their purported goals, such as the statement in their *Strategic Plan 2002-2007* that read, “Part of the cultural transformation needed throughout the American education system is the switch from a fascination with instructional fads to a focus on scientifically based research” (U.S. Department of Education, 2002).

Ultimately, the Department decided to move forward with these amended regulations and stated their disagreements with the concerns that were raised, noting that the amendments are nondiscriminatory, and each school’s decision to implement single-sex classes is entirely an individualized decision (U.S. Department of Education, 2006a). As a result, the number of public schools that have single-sex offerings for their students has risen in recent years. The National Association for Single-Sex Public Education

⁵ Additionally, some women’s organizations claimed that these recent amendments first received serious consideration when it was argued that single-sex schooling could benefit boys (Younger & Warrington, 2007). They have expressed concern that these policies might serve to disadvantage girls such as by leading schools to place their “best” teachers in all-boy classrooms because these teachers are thought of as most able to handle the management issues associated with boys (e.g., Changes to Title IX weaken safeguards

reports that for the 2008-2009 school year, at least 392 public schools in the United States will offer single-sex educational opportunities, up from just 4 public schools in 1998 (Dee, 2006; National Association for Single Sex Public Education [NASSPE], 2008).

Reasons People Support and Oppose Expanding Single-Sex Educational Opportunities

There are many reasons why people support or oppose single-sex educational opportunities and their views might depend on the grade level being discussed. Given the aim of this dissertation, I will primarily focus on the perspectives raised regarding educating adolescent boys and girls. The views presented below do not constitute an exhaustive list of reasons why people favor one environment more than the other one, but they are sufficient to provide insight into the various rhetorics surrounding conversations involving public single-sex education. Similarly, not all of the claims noted in this section are supported by research. In an effort to evenhandedly present the different voices involved in these discussions, I refrain from delving into the validity of all of these claims here. The section that follows, “Research Studies Investigating Single-Sex Education,” will discuss some of the research that has explored single-sex offerings.

Secretary of Education Margaret Spellings emphasized the rhetoric of “choice,” when explaining her support for single-sex offerings. Although she said, “Research shows that *some* students *may* learn better in single-sex education environments,” she stressed that, “The Department of Education is committed to giving communities more *choices* in how they go about offering varied learning environments to their students” (italics added, U.S. Department of Education, 2006). In Michigan, people have written

against sex discrimination in public ed, 2006; NOW opposes single-sex public education as “separate and unequal”, 2006).

that state legislation expanding these opportunities was driven by the need to curb the steep decline in enrollment in Detroit public schools as many of these children have begun attending charter schools (Dillon, 2006). By granting families more choices in the types of public schooling their children can attend, there is a belief that more families will have their children remain in, or return to, public schools. Legislation in other states, such as California, has similarly emphasized choice as the main focus for these new opportunities (Bracey, 2006).

Other proponents of single-sex education have stressed ways these offerings might benefit girls, boys, or both. As noted earlier, reports have claimed that girls were being “shortchanged” in classrooms because teachers devoted more time and attention to their male students (AAUW, 1992; Sadker & Sadker, 1994). As a result, some proponents of single-sex education have claimed that these settings could lead girls to receive more attention from their teachers (Mael, 1998). Additionally, people have argued that boys tend to dominate classroom discussions and activities and their behaviors prove distracting to girls academically (Younger & Warrington, 2007). Therefore, removing boys from the room might grant girls more opportunities to participate in class, focus on lessons, and ultimately benefit their performance.

Reports noting that girls neither perform as well as boys in measures that focus on science and mathematics, nor express as much interest in these disciplines and related careers, have led some proponents of single-sex education to claim that these environments could provide means to alter these outcomes (Ainley & Daly, 2002; Dee, 2005; Rowe, 1988; Stables, 1990). For example, Rowe (1988) explained that single-sex settings might lead girls to develop greater confidence in their abilities in mathematics

and science, leading to more positive outcomes in terms of their achievement in these disciplines. Similarly, Stables (1990) claimed that single-sex environments might contain less social pressure on students to choose courses that are nontraditional for their sex.

The analogous potential benefit for boys is that single-sex environments could enhance their interest in the humanities and increase their performance in disciplines and measures where they have reportedly underperformed relative to their female peers, such as reading (Dee, 2005; James & Richards, 2003). Given the concern about the “boy crisis” and how girls are now said to “rule” in school, people have commented that specific pedagogical approaches could be implemented to address boys’ academic underachievement (e.g., Gurian & Stevens, 2005; Sommers, 2000). As James and Richards (2003) wrote, “There is mounting evidence that schools, especially at the middle and high school level, are failing to meet the needs of boys” (p. 136) and people have emphasized ways single-sex classrooms could enable teachers to focus their teaching in ways to better meet boys’ needs, such as by talking louder or having more hands-on activities (e.g., Gurian & Stevens, 2005; Sax, 2005). Many of these proposed strategies have applied results from neuroscience to suggest that brain differences between males and females implies that there are unique instructional approaches and behavioral techniques that would be best to use with members of each sex (e.g., Gurian, Henly, & Trueman, 2001; Sax, 2005).

Other proponents of single-sex offerings have said that by receiving more teacher attention and having the floor more regularly, girls’ assertiveness and self-concept might be increased when they are educated in these settings (e.g., Science teacher at middle

school A, personal communication⁶, November 6, 2007; Rowe, 1988). Another benefit that has been primarily stressed for adolescent girls is that girls are less focused on their appearance, and more focused on their academics, without boys present (e.g., Eder, 1985). Mael (1998) explained that some people have said that coeducational schooling leads girls to adopt nonacademic demeanors and feel pressure not to outperform the boys academically. In terms of their interpersonal relationships, Eder's (1985) ethnographic research led her to conclude that the presence of boys in middle school classrooms led girls to overemphasize looks and sought the boys' attention to the point that same-sex friendships were harmed. Similarly, at least one teacher explained that she liked the single-sex classes because it was easier to talk with the girls in these classes about their appearance and how the clothes they wore impacted themselves and others (Language arts and mathematics teacher at middle school B, personal communication, February 27, 2007).

Some people have noted that single-sex environments can help teachers and schools address the rise in behavioral concerns related to boys that have been reported in many schools (Leonard, 2006; Martino, Mills, & Lingard, 2005; Mulholland, Hansen, & Kaminski, 2004; Tyre, 2006). Teachers and administrators have claimed that all-boy classrooms improved boys' behaviors by lessening the number of times the boys were sent to the office or received detentions (e.g., Mathematics teacher at middle school C, personal communication, March 9, 2007; Principal at elementary school D, personal

⁶ This section notes reasons that have been written in published papers, but also contains a number of reasons that were voiced during candid conversations held with teachers and administrators involved with single-sex programs in several public schools throughout Michigan. Although perspectives supplied by participants at the dissertation site will be a focus of Chapter 4, the comments raised by individuals from other schools seemed like important ones to include in this discussion. In order to de-identify them, I simply refer to them by the subject(s) they taught the school year I spoke with them and a pseudonym for

communication, March 13, 2007). One teacher said that the absence of girls leads the boys to be less inclined to act in anti-academic ways, often against school or classroom rules, in efforts to gain attention and affection from female peers (Science teacher at high school E, personal communication, October 31, 2007). Conversely, some teachers have claimed that it is easier to discipline boys and have them behave in more desired ways when their classes are coed because the presence of girls among boys tempers boys' misbehavior (Bracey, 2006; Jones & Thompson, 1981). These teachers have expressed a preference for teaching in coed settings because of this behavioral benefit.

Other proponents of coeducational offerings support these settings because these comments could serve as equalizing institutions that can better enhance equity between the sexes and lessen sexism (Kenway & Willis, 1986; Lee, Marks, & Byrd, 1994). As Arms (2007) cautioned, the history of single-sex schooling in the United States suggests that single-sex education can maintain or exacerbate inequalities between men and women. This outcome was certainly true before coeducation was adopted by many schools in the 1800s and remained true when boys and girls were educated in the same building but followed sex-specific tracks (e.g., Arms, 2007; Tyack & Hasnot, 1990). Although coeducation has clearly not eliminated sexism or inequalities between the sexes, it is argued that teachers and schools might be better able to confront and counter equity issues and sexism if the students are taught in the same rooms (Kenway & Willis, 1986).

Some people support coeducational environments because they better reflect the “real world” where males and females regularly interact and can therefore better prepare

their school, which will consist of “elementary/middle/high school” and a letter enabling readers to see which views were expressed at the same school.

students for these settings (Mael, 1998). Likewise, supporters of coeducation have said that these environments can introduce students to unique perspectives members of the “opposite” sex bring to academic material and therefore broaden their academic experiences and introduce them to more varied viewpoints (Robinson & Smithers, 1999; Younger & Warrington, 2007).

People who oppose single-sex environments have argued that boys and girls should continue being taught together because these classes are more likely to disrupt essentialist notions of maleness and femaleness that are implicitly, or explicitly, endorsed when students are separated by sex (Heise, 2004; Martino, Mills, & Lingard, 2005). Additionally, some supporters of coeducational schooling have argued that single-sex schooling could lessen the likelihood that students would gain experience developing friendships with members of the “opposite” sex and could reinforce heteronormative views. As one student from an all-girl school commented, ““Not seeing [boys] in a working environment, you only ever saw them as a possible romantic thing. You were never looking for them as a friend”” (Robinson & Smithers, 1999, p. 35). Other people have supported coeducational environments because of concerns that single-sex settings could lead boys and girls to homosexuality (Leonard, 2006). In fact, two principals of public elementary schools that contained single-sex classrooms told me that a major reason many parents of boys removed their children from their schools – after the schools had implemented single-sex classrooms – was because they claimed that these classes would make their sons “gay” (Principal at elementary school D personal communication,

March 13, 2007, Principal at elementary school F, personal communication, March 12, 2007)⁷.

As seen in the paragraphs above, people have supported or opposed single-sex and coeducational schooling for a variety of reasons. Regardless of the reasons voiced for favoring single-sex educational offerings, there were few opportunities for such environments in public school until recently. As Salomone (2006) wrote, shortly before the federal Department of Education amended regulations to Title IX, “Washington appears to be on the brink of officially approving an educational approach that lacks an ‘exceedingly persuasive’ justification backed by ‘scientifically based research’” (p. 780). But what has research said about these environments, specifically those settings most similar to the ones studied in this dissertation?

Research Studies Investigating Single-Sex Education

This section provides an overview of selected research studies that have explored single-sex educational settings. Before delving into specific studies, it is valuable to note that syntheses of related research have agreed with Salomone (2006) and concluded that there is little evidence to strongly support endorsing single-sex programs over coeducational ones (Arms, 2007; Mael, 1998, U.S. Department of Education, 2005a). Within these syntheses, there has been an acknowledgment of the dearth of quality research that has examined these environments. For example, in their systematic review of the quantitative and qualitative research literature, the U.S. Department of Education (2005a) reported that few studies met their initial standard for rigor and even after

⁷ Both principals said that this concern was expressed by parents of male students, but not by parents of female students.

relaxing the standards for inclusion in the review, they concluded that, “as in previous reviews, the results are equivocal” (p. 12). Given these results, I have chosen to first introduce some concerns with prior studies and then discuss research that has explored single-sex science and mathematics education at the secondary level.

Concerns with Prior Studies

Most of the research that is cited to support expanding single-sex opportunities in public education has focused on studies conducted in other countries or studies of single-sex education in private and religious schools in the United States. Although these studies are valuable to these discussions, people should be wary of generalizing the results to public schools in the United States.

Many of the foreign studies have explored public single-sex schools in countries that differ in important ways from the United States. For example, given that Islam dictates that the sexes remain separate from puberty, many predominantly Muslim countries, as well as members of Muslim communities in the U.S., have strongly supported single-sex schooling (Bracey, 2006; Robinson & Smithers, 1999). Even countries that are not predominantly Muslim have had longer histories with public single-sex schooling than the United States, leading people in these countries, such as the United Kingdom and Australia, to be more comfortable and accepting of public single-sex education (Arms, 2007). Therefore, the results reported from these schools might differ from those that would be expected in public schools in the United States that were to begin offering single-sex opportunities (Tyack & Hansot, 1990; U.S. Department of Education, 2005a).

Similarly, since few public K-12 schools or public colleges in the United States are single-sex, most studies of single-sex education in the U.S. have focused on private and religious schools, which often draw a select group of students from higher socioeconomic groups or specific religious followings than many public schools (Mael, 1998; Riordan, 2002). This fact makes it difficult to generalize their findings to public schools.

Additionally, the research that examines single-sex education mainly studies phenomena at single-sex *schools*. Few studies investigate single-sex *classes* within coeducational schools, even though some individuals argue that the benefits of single-sex education could be realized through single-sex classes (e.g., Moore, 1993). Research that can be used to support these claims is incredibly sparse and often draws from schools located outside the U.S., private schools, or a few public schools where students volunteer to be in these classes and the findings might be affected by self-selection biases (Jackson, 2002; Mael, 1998).

Given these concerns and the focus of this dissertation, I elected to concentrate my review on studies that investigated single-sex educational offerings in the United States, especially those that focused on science and mathematics education at the secondary level⁸. The results of these studies might not translate directly to the setting I investigated, but they have contributed to the discussions that have arisen surrounding expanding these offerings to secondary students in the United States. Although my dissertation focused on science, several of these earlier studies examined both science and mathematics together because both disciplines serve as important gateways to various careers and higher-paying jobs, plus different outcomes for male and female

students have been reported in both disciplines (Dee, 2005; Fennema, 1990; Freeman, 2004). After discussing these studies, I will focus on specific concerns regarding disparate outcomes reported for girls and boys in science education.

Single-Sex Education Research: Science and Mathematics

Wood and Brown (1997) investigated whether girls were more likely to take advanced math and science classes as a result of completing a single-sex College Algebra I class in 9th grade instead of a coeducational section of this course. They examined course selection data for 129 female students in a coeducational public high school, 52 of whom were randomly placed into the single-sex section by the school's computerized scheduling program⁹. They reported no significant differences in course selection between these groups of girls, but did find that the girls who had completed the single-sex course experienced a larger increase in their Maine Educational Assessment scores between 8th and 11th grades. Their results suggest that the single-sex classes might have benefited the girls' academic performance, but did not impact their decision to take additional math and science classes. However, they did report hearing anecdotal statements from interviewed girls that the girls' confidence increased after their experience in the single-sex classroom. Other studies, such as ones Streitmatter (1997, 1998) conducted, focused on such attitudinal changes that might arise from students' enrollment in single-sex mathematics and science offerings.

⁸ For information on additional studies, please refer to one of the papers in the references list that focuses on a broader array of single-sex studies (e.g., Arms, 2007; Mael, 1998; McEachern, 2007; U.S. Department of Education, 2005a).

⁹ Although this computerized scheduling program initially placed students into different sections, Wood and Brown (1997) noted that, "one or two parents each year requested that their daughters be included in the all-female section" (p. 269).

Streitmatter (1997) studied a single-sex and coed mathematics classroom taught by the same teacher in a coeducational public middle school to examine girls' risk-taking behaviors and view of themselves as mathematicians. She observed these classes approximately every 10 school days and interviewed 14 of the 24 girls who were in the single-sex class. Her results indicated that the girls in the single-sex setting were more inclined to ask and answer questions and they expressed greater confidence in their math abilities as a result of being in the single-sex class. Similarly, she performed an ethnographic study (1998) of two physics classes – one all-girl and one coed – taught by the same teacher in a public coeducational high school. She observed these classes approximately every 10 school days and interviewed 12 randomly selected girls from the single-sex class. She reported that girls in the single-sex class had enhanced perceptions of themselves as competent science learners and appreciated receiving all of the teacher's attention. The girls reported that this increased attention, and their views that the classroom atmosphere was "friendlier" than the atmosphere in coed classrooms, led them to find this class less formidable than they thought it would have been if boys were in it.

In her 1999 book, *For girls only: Making a case for single-sex schooling*, Streitmatter endorsed single-sex education for girls, largely because of these attitudinal benefits. Although her review of quantitative studies used to measure students' achievement led her to conclude that the results were contradictory and inconclusive, she claimed that these settings were valuable and worth supporting because of the results found in her studies and similar results indicating that female students were more focused on their academics in all-girl settings and that girls in single-sex settings expressed more

positive attitudes towards math and science. To her, these attitudinal benefits were reason enough to support single-sex education.

Unlike Streitmatter, Baker (2002) argued that enhanced attitudes, including feelings of empowerment and improved self-concepts, were *not* sufficient benefits to claim that single-sex classrooms were good for girls. Baker sought to increase girls' participation in science courses and careers and wrote that, "affective improvements alone will not increase the number of girls who choose science and mathematics...A high level of mastery of the material is also needed" (p. 19). She engaged in her own study of single-sex middle school science and mathematics classrooms at the request of the teachers who instituted these new courses. She used classroom observations, classroom artifacts, students' grades, and interviews with the students and teachers and recorded her general objective as being, "to investigate what occurred during a single school year in single-sex science and mathematics classrooms in a middle school" (Baker, 2002, p. 4).

She noted that the teachers established these classes because they believed these settings would, "lead to higher academic achievement, better self-concepts, a feeling of empowerment, and better attitudes toward science and mathematics for girls" (p. 4). Although the girls earned higher grades than the boys in these classes, the teachers acknowledged that the girls' grades were not much different than the grades they had received in their previous coeducational science and mathematics classes. Baker concluded that the single-sex environment did not seemingly impact the girls' grades but might have contributed to girls' reported feelings of empowerment and positive self-concept. As for the boys, she reported that the single-sex classes did not positively impact them. In fact, she wrote that the, "all-boy classes acquired the stigma of being

unteachable” (p. 20) and the teachers liked the girls’ classes more, which was communicated to the students through classroom policies and student-teacher interactions. Ultimately, she expressed concerns about teachers and schools implementing single-sex courses without them engaging in more preparation and professional development before and while teaching these classes¹⁰.

Another single-sex study with a mathematics focus was Steinback and Gwizdala’s (1995) investigation of students who attended two single-sex Catholic schools that merged, one all-boy school and one all-girl school. Steinback and Gwizdala focused on the students’ attitudes towards mathematics, specifically their self-confidence with the discipline and views regarding its usefulness, by having them complete an investigator-constructed instrument. The year before the schools merged, they had 353 students from the all-girl school complete this questionnaire and in year two, after the schools had merged, 697 students (323 female students, 374 male students) completed this questionnaire.

They analyzed the responses of female students who participated in both years of the study (173 students) to see if their attitudes changed within the first year of the merger, and also compared responses of female students from year two with those of male students to see if their responses differed significantly. Overall, the female students’ attitudes remained positive and fairly unchanged as a result of this merging and a significantly greater percent of male students reported being good at mathematics and that the subject was useful to them. Therefore, Steinbeck and Gwizdala concluded that

¹⁰ Other writers have expressed similar concerns regarding the limited amount of training and professional development surrounding single-sex teaching and how these settings can lead teachers to reinforce traditional stereotypes for boys and girls (e.g., AAUW, 1998; Dillon, 2006; Herr & Arms, 2002; Martino,

the girls' attitudes did not significantly decrease as a result of being in classes with boys but that more work needed to be done to find ways to enhance female students' confidence in their abilities and see the usefulness of mathematics.

One common thread through all the studies presented in this section is that the researchers primarily focused on girls, possibly suggesting a greater interest and attention to their outcomes. For example, Steinbeck and Gwizdala (1995) focused on how the merger of these schools impacted the female students. Their paper did not explore how this merger affected the male students by having them complete the questionnaire both years. As Mael (1998) wrote, "the overwhelming preponderance of research [of single-sex education] has focused on females and female concerns" (p. 117). In my opinion, research studies exploring single-sex education, or any study that aims to explore outcomes for boys *or* girls, have implications for both boys *and* girls. Although I entered this dissertation study planning to focus on both an all-boy and all-girl single-sex science class, recent discussions that focus on equity issues involving boys and girls in science education has paid a lot of attention to concerns regarding girls in science.

Science Education

Reports have noted that boys tend to outperform girls in many science disciplines, **and** take more AP science classes (Freeman, 2004). Although differences in boys' and **girls'** science coursetaking have shrunk during the last decade, such that they take **comparably** challenging academic programs in science, male students are still more likely **to** complete undergraduate and doctoral programs in science (Freeman, 2004; National

Mills, & Lingard, 2005). Readers are encouraged to refer to these articles for more discussion and resources **on** this topic.

Academies, 2007). By 2001 there was relative parity in terms of the number of bachelor degrees awarded to male and female students in the biological sciences/life sciences and psychology, but male students still received a larger proportion of bachelor degrees in other science fields like computer and information sciences, physical sciences, and engineering (Freeman, 2004). Given that science can serve as a gateway to many lucrative jobs and professional opportunities, these sex differences have great educational, economic, social, and political importance (Fennema, 1990; Freeman, 2004).

The reasons these differences arise are as varied as the people writing about them. Some people have argued that behavioral and cognitive differences between boys and girls affect, at least in part, these outcomes (Halpern, 1992; Gurian, Henley, & Trueman, 2001; Sax, 2005). These authors do not state that biology is the sole cause for these differences, and instead note that these outcomes arise due to interactions between biology and sociocultural factors. At least one of them emphasized that the within-sex variability on certain measures is often as large, or larger, than the between-sex variability, but that these results do not suggest that mean differences between the sexes do not exist or that biological influences are negligible (Halpern, 1992).

Other researchers primarily emphasize sociocultural factors as affecting the different outcomes experienced by boys and girls in science. Shepardson and Pizzini (1992) reported that both lower and upper level female elementary teachers treated boys and girls differently in science class, in ways that might have communicated negative messages to female students, because the teachers believed boys possessed greater cognitive intellectual skills. Still other people emphasize that women are less engaged in science and less likely to succeed because science is viewed as masculine (e.g., Kelly,

1985). They argue that this perception is constructed and reinforced because more men tend to study it, teach it, and be recognized as contributing to it, curricular materials are often biased towards men (e.g., focusing on examples and experiences that are traditionally more common to male students than female students and displaying more images of men engaged in science), and science classes often treat science as impersonal, free of feelings, and competitive, which are stereotypically masculine characteristics (Eisenhart, Finkel, & Marion, 1996; Kahle & Meece, 1994; Kelly, 1985).

These characteristics are often associated with the “nature of science”, or epistemological views of science, supported by some people, curriculum materials, and activities in science classrooms. The nature of science that gets endorsed in a classroom can influence individuals’ comments regarding the goals of science, the role of experimentation, how scientific ideas change over time, and what qualifies as valued knowledge (Sandoval, 2003; Smith, MacLaine, Houghton, Hennessey, 2000; Stanley & Brickhouse, 2000). By associating masculine characteristics with (school) science, curricular materials, classroom activities, and actions taken by teachers and students often construct and maintain a “masculine nature of science” that can be unwelcoming to many females (Bianchini, Hilton-Brown, & Breton, 2002; Sowell, 2004). For example, some people claim that the nature of science, specifically Western modern science, marginalizes women and other oppressed peoples by endorsing the belief that scientists are dispassionate, unbiased experimenters who discover the truth about nature, without acknowledging the passion, politics, prejudices, and invention involved in science (Hodson, 1999; Sowell, 2004).

The nature of science, sociocultural factors, and differences in achievement

measures including test performance and coursetaking patterns, could impact a variety of outcomes for male and female students in science. The fact that many of these differences are first reported among middle school students was one reason I sought to focus on middle school science classes.

Middle School and Adolescence

I chose to study middle school students for two main reasons. One, as mentioned at the end of the last section, was that it is at this time in students' schooling when significant gaps appear between male and female students' performance in, and attitudes towards, science education. Campbell, Voelkl, and Donohue (2000) reported on trends in the National Assessment of Educational Progress (NAEP) 1996 science assessment scores that although boys and girls were found to perform equally well on this standardized measure in elementary school, middle school boys significantly outperformed middle school girls and these differences were seen to persist through high school. The American Association of University Women (1992) and Catsambis (1995) reported that the appearance of this gap in science achievement during middle school coincides with a time when girls' science self-concept and attitudes towards science declined. Therefore, I sought to investigate a middle school setting because of the importance this time period might have on students' interest and performance in science.

This study also focused on middle school students because they are engaged in a critical period in their development as men and women (Zittleman, 2007). According to Erikson's (1968) stages of psychosocial development, people often encounter an identity crisis during adolescence where they engage in intense analysis and exploration of

looking at themselves in hopes of determining who they are. Given my interest in exploring how single-sex classes could impact students' understanding of what it means to be boys and girls and what it means to learn science as boys and girls, it seemed wise to focus on middle school students for this dissertation project.

Mandel and Shakeshaft (2000) also noted that this period in adolescence is a time when significant physical, sexual, cognitive, and emotional changes occur in people. Stereotypes used to differentiate boys and girls are often strengthened during adolescence – a time of increased self-consciousness and sensitivity (Harter, 1990) – and practices in schools and other institutions can affect the construction of these beliefs (Mandel & Shakeshaft, 2000). Although some people have claimed that these differences are rooted in biology, some authors have argued against this “gender differences” model (e.g., Hyde, 2005). Hyde claimed that this differences model dominates the popular media but that after reviewing 46 meta-analyses, she endorsed the “gender similarities hypothesis.” She concluded that the sexes are similar on most psychological variables, and overall that “men and women, as well as boys and girls, are more alike than they are different” (Hyde, 2005, p. 581). By investigating middle school students and classrooms, researchers could explore how some of these differences might be constructed or reinforced through various messages that are communicated to students.

Conceptual Framework

My Background and Perspective as They Relate to Single-Sex Schooling

My Background

Related to the general concern that there is limited quality research that has explored single-sex public education is the concern that much of the work and reports that have been published have been ideologically driven more than data driven (Arms, 2007). In fact, Haag wrote that, “Assessments of single-sex education’s ‘success’ or ‘failure’ ...are contingent on the goals of the stakeholders” (AAUW, 1998, p. 14). Given this concern, as well as my epistemological stance that researchers are not separate from that which they research (e.g., Denzin & Lincoln, 2005; Geertz, 1988), I feel it is important to be upfront about my background and views in order for readers to examine potential biases or agendas I might bring to this work.

As for my educational background, I attended a public school district in a suburban New York town during the 1980s and 1990s. To my knowledge, all students in my community were in this district through eighth grade at which point several of them left to attend the nearby coed Catholic school. My parents had both received college degrees from public colleges in New York City¹¹ and my mother remained professionally involved with public educational systems by teaching in a New York City elementary school until a little before her first child was born.

During my elementary and secondary school years, I was not aware of many discussions at the schools or among local residents regarding sex equity issues and do not remember the topic of single-sex offerings being raised. The boys and girls were separate

¹¹ My father later earned a Master’s degree from a private institution.

for some health classes (e.g., lessons that focused on reproduction and sex education) and some activities in physical education. In high school, I spent most of the day traveling with the same group of “Honors” students through various classes. A slight majority of these peers were female, but I rarely remember noticing this imbalance and it did not make me feel uneasy in any way.

Given that the issues involved in a person’s development as a man or woman intersects with dialogues regarding sexuality, I think it is important to note that I was unaware of there being any same-sex relationships among adults or students in the town and it seemed as though everyone there were heterosexual. Homophobic insults were occasionally hurled at boys, sometimes as “jokes” and sometimes as more pointed attacks. These comments typically remained absent in classrooms and were most present in the locker room and outside of school. The school did not contain a Gay Straight Alliance, or similar group. Although before leaving for college I did not knowingly meet any individual who identified as non-heterosexual, I recall expressing confusion and disagreement with a number of friends who commented about how “weird” or “disgusting” it was for men to “like” men, or women to “like” women.

As an undergraduate at Haverford College, my eyes and mind became much more aware of issues surrounding sex, gender, sexuality, and their intersections. This institution had a close relationship with Bryn Mawr College, an all-women’s college, located a few miles away and the two institutions introduced me to more feminist and Queer perspectives. Even as a physics major, a number of courses would discuss underrepresentation issues and raise the topics of sex, gender, race, and other cultural identifiers in relationship to their effect(s) on science (and vice versa). Some of the

courses I took, such, “Sex and Gender on Film,” “Theories of Sexuality,” and “Gender and Science,” devoted much attention to the topics of sex, gender, and sexuality and further raised my awareness of the influence these constructs had on all societal interactions.

Within Haverford’s Physics Department, there was discussion surrounding the fact that they had few female majors. In fact, during one three-year span that overlapped with my time at Haverford, there was only one female physics major. Conversely, Bryn Mawr College was praised for having so many of their students majoring in Physics. Due to my developing interests, I used my undergraduate thesis to examine and compare lessons and activities that were implemented as part of the energy and momentum units in the introductory physics courses at these two institutions. Additionally, I interviewed students regarding their content knowledge and spoke with professors about their pedagogical approaches and aspects related to equity issues in science education.

Although I reported no major differences between the two introductory courses, these experiences further introduced me to issues related to equity, especially in science education, and I believe they affected my subsequent work as a physics teacher at a high school. While teaching, I noticed that many male students struggled in my courses and a number of female students enjoyed them and participated actively. These experiences led me to become more cognizant of the broad generalizations sometimes used in sex differences research as well as in everyday language. Overall, my experiences as a science teacher and student have sensitized me to the role sex and gender can play in students’ engagement and learning in science classrooms. As a result, when I returned to

academia as a full-time student, I became more invested in exploring within and across sex variability.

My Perspectives on Single-Sex and Coeducational Schooling at the Start of this Study

The above paragraphs introduced readers to elements of my background that led me to this study, but they did not explicitly address whether I supported or opposed expanding single-sex schooling opportunities and if I tended to favor one setting over the other. In truth, I started this work without strongly favoring or opposing either setting. When people both in and outside the academy learned of my work, they often asked for my “answer” regarding which setting was better. I typically hedged a response, listing some potential benefits and drawbacks of both settings and saying that the answer might vary school-to-school and one form of schooling might be beneficial for some, but not all, students (AAUW, 1998; Mael, 1998). Interestingly, many people who spoke with me then proceeded to tell me their opinions, which were often based on their own experiences or anecdotes from others’ experiences.

Knowing that there was a lack of quality research that had explored these offerings in public education, I was interested in people’s comments because they often expressed such strong opinions without having done or read much quality research on this issue. My views were a lot more malleable at that point and like Purcell-Gates (2004), I believed that this initial perspective was well-suited for my proposed ethnographic study since I did not already know what conclusions I would reach.

Clearly, I was not a blank slate regarding this issue, but I could see potential benefits and drawbacks to single-sex educational opportunities. Although I was hesitant

about the essentializing of boys and girls that might take place in sex-segregated classrooms, my own opinions were that single-sex classrooms could benefit some students, some times, in some ways. Although I disagreed with many popular beliefs that men and women were inherently different, and therefore might possibly benefit from different classrooms or possibly different pedagogies, I could not fully deny that a part of me accepted and agreed with this notion of difference. At the start of the study, I believed that men and women were more alike than different but that there might be differences that could be utilized in ways to positively affect some educational outcomes.

Overall, I started this study neither fully convinced that the amended Title IX regulations should be eliminated, nor wholly embracing the concept of expanding single-sex offerings for students. I was excited that my study would further impact my opinion and could contribute an even-handed analysis and voice to discussions surrounding this topic. Ultimately, my views have been affected by my time at this dissertation site and the writing of this dissertation. Chapter 8 provides information regarding my more recent thoughts on this issue.

Sociocultural Perspective, Postmodernism, and Queer Theory

My conceptual framework draws on a postmodern queer lens that examines learning phenomena from a sociocultural perspective. I have chosen to introduce these constructs – postmodernism, queer theory, and sociocultural perspectives – in the same section because they are interconnected and the idea of interconnectedness is central to them¹². In the process of introducing them, I will discuss several terms that are central to

¹² My view that different constructs are interconnected made it extremely challenging for me to write and separate sections in this dissertation. The headings that separate sections of this chapter, and other chapters,

my research questions and will appear throughout the paper. These terms are “learning,” “culture,” “identity,” “sex,” and “gender” and I will use elements of my framework to clarify how I see these terms. The following pages introduce readers to the lenses and perspectives I applied to the phenomena being investigated. Additional information about these perspectives, and how they impacted my methods, data, and analyses, will be discussed further in subsequent chapters.

Sociocultural Perspective

When investigating educational phenomena, I do not view constructs, including individuals and groups, as though they are wholly distinguishable from their context.

Martin (2006) summarized the sociocultural perspective that I employ when he wrote,

Social cultural perspectives in educational psychology do *not* understand historical, cultural, contextual, and interpersonal practices of schooling and teaching as factors that affect the cognitive and motivational strategies of learners and the instructional goals and methods of teachers...Learners and teachers, like all persons, are sociocultural entities formed through their active participation in relevant historically emergent, sociocultural traditions and practices. (p. 611)

This lens does not separate individuals or groups from their surroundings and sees them as being “formed” through their interactions. As Rogoff (2003) explained, people and their contexts create each other and they are interconnected. According to this perspective, knowledge is a social construct and is not a reified entity that is the property

are not true boundaries that aim to distinguish topics from other topics as though they were distinct conversations that neither overlapped nor intersected. These divisions are used for both readers and me as a convenience to more easily introduce different relevant background information.

of individuals (Prawat, 1996)¹³. This perspective has significant implications for how I initially envisioned learning, culture, and identity.

“Learning,” “culture,” and “identity”

In agreement with this sociocultural perspective (and postmodern thinking and queer theory), learning is not viewed as the acquisition of some thing – as it is typically viewed in cognitive perspectives (Sfard, 1998). Instead, learning, specifically in classrooms, is defined as “a process in which students actively reorganize their ways of participating in classroom practices” (Cobb & Bowers, 1999, p. 9). Therefore, learning does not depend on students’ internal possession of bits of knowledge but rather on their relationship with the contexts in which they participate. As a result, learning is a co-constructed process and involves the development of individuals’ identities within a given social group through their engagement with practices that are valued by the group (Cobb & Bowers, 1999; Greeno, 1997; Greeno, Collins, & Resnick, 1996; Lave & Wenger, 1991).

This concept of identity relates to an individual, “being recognized as a certain ‘kind of person,’ in a given context” and is co-constructed between individuals and their interactions with their environment, including other people (Gee, 2000/2001, p. 99). For example, a student’s more frequent participation in classroom discourse practices, such as following practices that allow for greater entry into discussions or competently using

¹³ In agreement with this perspective, I acknowledge that my participation in this study impacted the phenomena I chose to investigate, including the data and analyses that will be discussed. I have made a conscious effort throughout this dissertation to write about the “generating” of data instead of the “collecting” of data, because I believe the information being analyzed and discussed throughout this project was not “there” to be acquired, interpreted, and disseminated by me, but instead that it was co-generated through the methods employed and the lens applied to this work.

terms that have been given value in that space, could suggest that this student is constructing an identity as more of an “expert” in this class relative to others who exhibit struggles with these practices.

Within the single-sex classrooms studied in this dissertation, individuals are developing multiple identities – including ongoing construction of what kind of science learner they are and what it means to be men/women. These identities, as well as the developing of these identities, are not wholly distinct as their identities as science learners might intersect with their identities as men/women. For example, in some classrooms a student might develop the understanding that being a male science learner means that he should not show disgust at handling internal organs. Related to this point is the perspective that students’ identities are often tied to specific sociocultural groups, such as “boys” or “girls,” that might be defined in a given context. As a result, their identities as boys and girls might be greatly impacted by the fact that within a single-sex program they are slotted into classrooms based on their “boy” or “girl” status, or possibly their “non-girl” or “non-boy” status.

These single-sex classrooms develop their own identities, which I am labeling “cultures.” These cultures are mutually constituted by the members who comprise the class and the practices in which they engage. As Rogoff (2003) explained, “In the emerging sociocultural perspective, culture is not an entity that influences people. Instead, people contribute to the creation of cultural processes and cultural processes contribute to the creation of people” (p. 51). Rogoff is saying that people should not imagine there being a uni-directional arrow in which culture is seen to impact individuals,

but that people should envision culture and individuals as being enmeshed together and constantly forming and reshaping themselves through their interactions.¹⁴

Given this perspective, members of each single-sex classroom (and any classroom for that matter) can be seen as developing identities as well as contributing to the development of the classroom culture itself. However, individual girls' identities do not need to overlap with the culture of the all-girl class that gets developed in an individual school, and analogous reasoning can be applied to the boys' class. By this statement, I mean that if the girl class develops an identity, or culture, of being the "good class," individual girls in this class might still construct identities as bad students. Gutiérrez and Rogoff (2003) noted that scholars have raised concerns with "essentializing" people on the basis of a group label and researchers and practitioners should focus on variations in individuals' and groups' engagement in different behaviors.

Postmodernism and Queer Theory

This sociocultural perspective is born out of a postmodern tradition. Postmodernism argues that objectivity or reality is situated rather than universal and can be understood differently from and within different epistemologies (Bilodeau, 2007; St. Pierre, 2002). Similarly, queer theory is a postmodern construct (Wilchins, 2004). Whereas postmodernism focuses on investigating and reporting how the researcher, researched, and act of research construct what people know, queer theory pushes these

¹⁴ Likewise, Rogoff (2003) might not endorse visual models that use two-headed arrows connecting individuals and culture if these two constructs are pictured as separated from each other, implying that they are each stand-alone entities. In general, she expressed concern with the use of visual tools for explaining theoretical ideas and wrote, "Visual tools for communicating theoretical ideas constrain our ideas, often without our noticing the constraints" (p. 49).

ideas a bit further, essentially inverting the roles of the researcher and researched by focusing on how both construct the other (Dilley, 1999).

Queer theory focuses on any forms of communication used to convey an understanding of one's world and like many strains of postmodernism it questions the very language that is used to convey and conceptualize thoughts (Dilley, 1999; Wilchins, 2004). It challenges terms that are often used to organize people and society and rejects binary distinctions, such as male and female, as being arbitrarily defined by those people and groups who have developed social power (Dilley, 1999). Two traditional binaries include the constructs sex and gender, which are used by many people to divide the human race into two categories. Given this dissertation's focus on "single-sex classes," or what some people call "single-gender classes," it is important to explain how these terms will be used in this dissertation and how I interpret these constructs through my queer theoretical lens.

"Sex" and "gender"

Researchers, as well as many people outside the academy, often use *sex* and *gender* interchangeably (Glasser & Smith III, 2008; Haig 2004). Although the terms are conceptually related to each other, they are distinct. Many people's colloquial understanding of *sex* is that it is a biological distinction that dichotomizes the entire human family into two disjoint groups, males and females, while *gender* is a sociological category that relates to social and cultural bases impacting what it means to be a man or woman. Although gender is more readily viewed as a continuum, it is still often constrained as being comprised of two overarching "opposite" categories: man and

woman (Lev, 2004). Queer theory disrupts the notion that sex and gender are truly binary systems.

At birth, sex is often determined rather simplistically by whether or not a newborn has a penis (Lev, 2004)¹⁵. Many individuals who practice Western medicine will also note that sex involves a complex relationship of genetic, hormonal, and anatomical determinants (Lev, 2004). However, approximately 2 percent of the population are intersexed and not easily assigned to one of these sex categories at time of birth (Lev, 2004). Many medical doctors, especially those practicing Western medicine, have sought and continue to seek to “fix” these newborns so they can more easily be categorized as male or female (Califa, 1997; Colapinto, 2000; Wilchins, 1997). There is no known health risk involved with being intersexed, but many doctors and families opt to have their newborns undergo surgery in order for them to be either “male” or “female” (Colapinto, 2000). Many postmodern and queer theorists oppose these actions, which aim to maintain the existence of two sex categories, and instead push for deconstructing these categorical boundaries embedded in the dimorphic language of biological sex (Bornstein, 1994; Dilley, 1999; Wilchins, 2004).

Similarly, they challenge the terms that organize people into the related binary *gender* categories of “man” and “woman” because these terms also place arbitrary boundaries on people. Wilchins (2004) explained how language constructs these boundaries through a process of exclusion when she wrote:

words and meaning actually work because of a process of exclusion. Take “chair” for example. We know the meaning of chair by learning what is not chair. In other

words, we exclude all the other close matches that aren't quite chairs: stools, chaise longues [sic], love seats, and so on. We create the template for chair by a process of exclusion. This means that from its inception, the meaning of chair depends on all those excluded things that are not-chair. With gender, we create the meaning of woman by excluding everything that is non-Woman, and vice versa for Man. We form idealized templates for what is perfectly masculine or perfectly feminine by excluding whatever doesn't fit: the queer, the different, the mixed... But because the meaning of Man depends on excluding what is not-Man—what is Woman—it is also permanently unstable. It always operates under tension, under the threat of these exclusions. (p. 36)

Although many people might presume to define things by what they *are*, Wilchins (2004) explained that these definitions, and the ability to categorize things, arise because of people's ability to define what they *are not*. An individual might not be labeled a "man" because he is assertive but could be labeled a man because he is not demure, or woman-like. But as Wilchins (2004) explained, these exclusions and boundaries are unstable. Even the notion of labeling demure as a woman-like trait has changed over time. Epstein (1997) noted that the Women's Movement of the 1960s and 1970s led many people to redefine what was appropriate for women as they received greater social approval for acting assertively. Therefore, the absence of demureness might not play as significant a role today, compared to points in the past, in labeling someone a man.

Such a perspective grants readers a new lens with which to look at research studies that have compared outcomes for male and female students. For example, in the

¹⁵ Such criterion marginalizes females by making males the focal sex upon which sex determinations are made (i.e., female newborns could be viewed as deficient in that they lack penises instead of being seen and

earlier discussion of Hyde's (2005) work, I explained that she argued against the "gender differences" model and instead endorsed the "gender similarities hypothesis." She concluded that, "men and women, as well as boys and girls, are more alike than they are different" (Hyde, 2005, p. 581). However, her conclusion could only have meaning after she, the studies she examined, and readers differentiated men from women. If Hyde, or other members of society, did not initially categorize people as men or women – or male or female – and thereby exclude people from each category, then they could not discuss whether those two categories of people differed from one another. As a result, reliance on language to communicate about these social groups inextricably resides in a need to exclude people from each group and divide the human race into separate categories that are socially constructed. These discursive acts reinforce a belief in there being differences between these groups, even when the argument might be that these two different (or possibly "opposite") groups are more similar than they are different.

As Bornstein (1994) wrote, "the culture may not simply be creating roles for naturally-gendered people, the culture may in fact be *creating* the gendered people" (p. 12). Likewise, Wilchins (2002) wrote, "binaries are all about power, a form of doing politics through language. Binaries create the smallest possible hierarchy of one thing over another. They are not really about two things, but only one" (p. 43). Wilchins' comment more elegantly expresses the thought I wished to convey above – binary systems arbitrarily divide the human race from a whole into distinct categories and the very act of separating something that is whole into separate groups implicitly initiates a discursive struggle in which the two groups must be defined, and hierarchically organized, relative to each other. Given my belief that defining social categories

identified by what they do have).

constructs boundaries, thereby acting to constrain people¹⁶, I agree with postmodern theorists who do not endorse defining such categories (e.g., Bornstein, 1994).

So what does this perspective imply for my study of all-boy and all-girl classrooms? From the outset it suggests that I bring some skepticism regarding the act of separating students according to these groupings. But the terms “sex” and “gender” will not be absent from the following chapters. Instead, I used the terms that were supplied by writers and participants (e.g., principals and teachers with whom I spoke often referred to these classes as “single-gender classes”) in an effort to best respect and value their voice.

When discussing my analyses or personal thoughts, I often use the terms that were provided by participants but will occasionally switch term usage to show the arbitrariness of their application and disrupt the boundaries that get reified through consistent use of the same term(s). Although this practice of interchanging terms can seem to adversely affect clarity, it is being done purposefully. Even if I tried applying the terms sex and gender as they are commonly used in education research – though poorly and inconsistently defined (Glasser & Smith III, 2008) – it would be unclear how to consistently refer to these classes. Sex is often used to refer to students who have been deemed male or female biologically, whereas gender refers to social characteristics regarding what it means to be men and women. Since some people see these classes as consisting of all male students or all female students, the classes could be envisioned as single-sex classes. But I would argue that “biologically male” students who grew up being in a household that enabled them to be labeled female and who exhibited social characteristics that were more strongly associated with female students than male

¹⁶ I acknowledge that social categories have provided some benefits for people such as by allowing them to identify as members of groups with cultural-historical traditions and feel connected with others through this

students (e.g., had longer hair, wore skirts, and dressed in more pinks and pastels) could be slotted into an “all-female class.” Therefore, although Haag wrote that, “Schools with all girls are not necessarily single ‘gender’ because they may include students with both ‘masculine’ and ‘feminine’ identities” (quoted in Datnow & Hubbard, 2002, p. 5), I similarly argue that schools with all girls are not necessarily single ‘sex’ because they may include students who are biologically male but are choosing to pass as female¹⁷.

Overview of the Dissertation

This chapter introduced the research questions, background information, and conceptual framework that impacted this dissertation, and many of these ideas will be developed in more detail in subsequent chapters. Chapter 2 explains the methods that were used in generating and analyzing data while Chapter 3 more thoroughly discusses the participants involved in this study. Chapter 4 delves into the perspectives for the single-gender classes in this particular middle school. Participants’ perspectives included the reasons they said these classes existed along with related comments they made regarding differences between seventh-grade boys and girls. Chapters 5, 6, and 7 focus on who boys and girls were constructed as being in the single-gender science classrooms and what it meant to learn science as boys and girls. The first two chapters make comparisons between the two classes as a whole – focusing on whether the two classes experienced the same science and same curriculum, and discussing the relationship between gender and interest in science respectively – while the third chapter explores variability within

membership.

¹⁷ Although I am unsure how all schools with single-sex classes slot students into different sections, it seems reasonable that most would make use of self-report or previously submitted demographic

each class. The last chapter, Chapter 8, closes the dissertation through revisiting the research questions, exploring the theory that emerged from this work, and providing some implications and concluding thoughts based on this work.

information as opposed to methods that seem to teeter closer to ethical and legal dilemmas including lifting skirts or requesting DNA samples from students.

CHAPTER 2: METHODS AND ANALYSES

This chapter focuses on the methods and analyses that were pursued in this dissertation. It discusses ethnography, data that was generated, grounded theory, and the issues of validity and generalizability. Through these discussions, readers are briefly introduced to several participants who will be described in more detail in the following chapter.

Methodology

Given that I applied sociocultural, postmodern, and queer lenses to aspects of a single-sex program in one middle school, my methodology – or the ways I attempted to link theory to methods – was primarily qualitative in nature because that approach enabled me to better understand the perspectives that were voiced and the cultures, identities, and meanings that were created in these spaces. To explore the research questions and constructs introduced in this dissertation, I engaged in an ethnographic study at one school and made use of field notes, audiotaped and videotaped class periods, students' work and classroom artifacts, and interviews with teachers, students, and an administrator. To analyze the data, I utilized a constant comparative method, or grounded theory (Corbin & Strauss, 1990; Glaser & Strauss, 1999). The use of ethnography and grounded theory are appropriate for this study given the study's exploratory nature and that I neither had preset conclusions I sought to verify nor firmly set categories into which I planned to code and analyze all data. As such, the methodology aimed to be responsive to the particular purposes and contexts of this research study (Howe &

Eisenhart, 1990). More details of my research methods and analyses, as well as their connections to my theoretical lens, are provided below.

Research Methods

Ethnography

In agreement with Creswell (2003), I believe the choice of methods should be determined by the research question(s) that are asked and the lenses the researcher(s) apply to the study. For me, an ethnographic study of two single-sex classrooms enabled me to better understand the cultures of these classrooms and what they suggested about who boys and girls are and what it means to be a male or female science learner.

Additionally, although questionnaires or surveys might have enabled me to generate data regarding participants' perspectives about the single-sex program, I was able to develop a deeper understanding of their views, and the complexities and nuances in their behaviors and voiced comments, through interacting with them over a sustained period of time.

This detailed study of a particular group is essentially how others have defined ethnography (e.g., Erickson, 1986¹⁸; Purcell-Gates, 2004). Although ethnographic studies take many forms and ethnographers could generate different data over variable amounts of time, there are several characteristics that remain constant across most ethnographic studies. These characteristics include that ethnographers perform their studies in natural settings (not in laboratories), make use of personal interactions with participants, and aim to accurately portray participants' perspectives and behaviors (Purcell-Gates, 2004).

¹⁸ Erickson (1986) explicitly defined ethnography as, "the detailed study of a particular society or social unit" (p. 130).

By engaging in a detailed study of two single-sex classrooms, I was better able to make sense of the participants, their interactions, contexts, and hear and see how they saw many of these same events. Although I could not enter these spaces as a blank slate, and instead arrived with my own views and personal history that impacted how I interpreted events, I did not begin the study with an agenda to (dis)prove specific claims.

Since ethnographers seek to understand and describe human behavior in more naturalistic settings, they tend to devote a sizable amount of space to descriptions of context, as well as the researcher's role(s) in these contexts. Chapter 3 will provide much more detail about the research site and participants involved in this study, but the following section explains how the particular middle school, P.D. James Middle School¹⁹, became the site for this dissertation work.

A Brief Chronology of My Time at the Research Site

To engage in an ethnographic study of single-sex middle school classrooms, I needed to gain entrance to a setting that had people who would participate in this study. To meet this goal, I knew it was important to develop rapport with an administrator as well as other participants who I wanted to include in this study (Purcell-Gates, 2004). Approximately one year prior to the start of the 2007-2008 school year – the time when I hoped to observe classes for this study – I began mailing letters to principals from several schools in Michigan that had single-sex programs²⁰. I noted my interest in observing their

¹⁹ All proper nouns related to the school, including students, teachers, and administrators, are pseudonyms.

²⁰ Although I desired to investigate middle school classrooms, I was open to alternative settings – especially if no middle schools would be willing or able to participate. I searched for schools online and found a handful of elementary, middle, and high schools (e.g., NASSPE, 2007). Additionally, I contacted the Michigan Department of Education, spoke with people in several offices, and was repeatedly told that no individual or group was keeping a list of schools or classes that were single-sex in the state (e.g., Teres

schools' single-sex classes and asked if I could visit to see some classes or at least talk by phone or e-mail with them or teachers involved with these programs. Additionally, I placed follow-up calls in hopes of having more administrators allow me to visit their schools. Ultimately, I visited the five public schools (three elementary schools and two middle schools) that agreed to have me visit.

Of the two middle schools I visited, only one planned to continue to maintain their single-sex program the following year²¹. This school, P.D. James Middle School, became the dissertation site after Principal Davis agreed to allow me to perform this study there. The sections below provide a brief overview of my time at the school and how and when different data generating tools were introduced. Afterwards, I will supply more information about the data that was generated.

Before Observing Classes

I first spoke with and contacted Principal Davis and the teachers who comprised this single-sex team, Ms. Small and Mrs. Frost, during the winter of 2007. I informally observed some of their single-gender classes and spoke with them about their experiences. They expressed interest in my research project and we continued these conversations throughout the spring and summer. After providing Principal Davis with information regarding the methods that would be used and meeting with her to discuss

[last name unknown], Center for Education Performance and Information, personal communication, April 26, 2007). As the study progressed, I became aware of additional schools throughout the state that contained single-sex classes and spoke with teachers and administrators from several of them, even visiting two of them.

²¹ The other middle school only had one team of sixth grade teachers leading single-sex classes. The principal expected to have major staffing changes that summer and was confident that some teachers who would be switching to that sixth-grade team would not want to continue the program, which had started that 2006-2007 school year. Ultimately, all teams in the school were coed during the 2007-2008 school year.

some details of the project, she officially agreed for the study to be performed at the school.

Unfortunately, Ms. Small, the science teacher whose classroom was slated to be the major focal point of the study, was hospitalized the first day of the school year and it was unclear if the project would continue. Although I hoped to be present in the science classroom that first day, this unexpected development led the project to follow a different track. Principal Davis, Mrs. Frost, and I discussed alternate plans and we decided that I would start the year in Mrs. Frost's language arts and mathematics classroom beginning the following week (see Appendix A for a calendar that notes some important events regarding the methods and data generated in this study). It was our hope that starting then would give the team some time to adjust to the sudden change in their makeup and it would provide the long-term substitute, Mrs. Kinsey, with a few days to get more comfortable with her position.

Introducing Various Data Generating Tools

When I finally met the students and observed Mrs. Frost's classes that second week of the year, I introduced myself, spoke with them about the project, and explained what I hoped to do while there. I had a notebook and laptop with me and told them that I would record notes about what took place throughout the day. That afternoon, Mrs. Kinsey agreed to participate in this research study and allowed me to start attending her science classes that week²².

²² Since the team only contained two teachers, each teacher met with the all-girl class and all-boy class two periods every day and chose to teach each discipline on alternating days, except on Friday when they taught all four subjects. As a result, Science was typically taught to each class for two periods on Tuesdays and Thursdays as well as one period on Fridays. Some changes in this schedule occurred during the weeks

When I observed the next science classes, I introduced audio recorders. I had not used the audio recorders when I first observed Mrs. Frost's classroom because I sought to introduce new data generating tools over several visits. Doing so would lessen the likelihood of overwhelming participants or constructing undesired barriers between them and me. Introducing these tools before participants had time to become comfortable with me might lead them to express greater concerns about my role or the use of these tools. As a result, I chose to introduce new instruments over several weeks as greater rapport and trust developed between me and the other participants.

During the next two weeks, I was present for all science lessons, observed some non-science classes, and made a point to get to know the students, teachers, and principal better. I had lunch with several students in the cafeteria, and had multiple conversations with Mrs. Kinsey, Mrs. Frost, and Principal Davis. Towards the end of the third week of the school year, I joined the teachers from this team when they met with the students' parents and guardians during "Curriculum Night." There I spoke directly with these adults about my work and addressed questions that were raised. The following week, I started videotaping lessons in addition to recording field notes and audio recording classroom events. That week, I also began interviewing participants.

Through the end of the first marking quarter, I continued attending classes, recording field notes, audiotaping and videotaping lessons, collecting students' work and classroom artifacts, and interviewing participants. In total, I was present for 22 days when science was taught and also attended several non-science classes. I ultimately stopped attending classes for two main reasons: (1) I had generated a sizable amount of data that

when students took statewide exams or on days when they had special events, such as speakers or assemblies. Appendix A provides more information about these changes.

would enable me to address my research questions and (2) financial concerns made it difficult for me to continue to live near the school and continue being present for so many classes. Instead, after the end of that marking period I remained in contact with several participants through e-mail, phone, and even text messaging as they continued to keep me updated on happenings in these classes and provided me with more information regarding the school and team.

Location of Data Generating Tools

The location of my video cameras and audio recorders impacted the data that was generated. But in addition to the placement of these tools, my location affected the data. As noted in my conceptual framework, introduced in Chapter 1, I view myself as a participant in this study who impacted the phenomena that was investigated. In addition to being someone who saw and interpreted events from a partial perspective, my presence, placement, and participation in these spaces could have affected other people's behaviors. Since Chapter 3 discusses more about me as a participant, I only want to talk now about my location in the classroom.

Throughout the first marking quarter, the all-boy class contained 32 students while the all-girl class contained 30 students. Given the size of these classes, I was unable to consistently sit beside students during lessons and activities. Instead, Mrs. Kinsey offered me the option of sitting at her desk near the front of the room, or at the back of the room near a raised science counter (see *Figure 1* to see the layout of the room at the start of the school year). Wanting to have a vantage point that was most similar to that of

the students, and also not wanting to too strongly distance myself from the students²³, I opted to sit at the back of the room. Although physically separated from the students by not sitting with them, I was very near some of them such that they frequently spoke with me and showed me things they had produced (e.g., off-task doodles or completed worksheets).

Beside me, in the back of the room, was one of the two video cameras. The locations for the two cameras remained fairly stable as one was placed in the back of the room while the other was at the opposite corner in the front of the room. The camera in the back was often directed towards the whiteboard and captured the backs and sides of many students. It provided a visual record that closely resembled what the room looked like from some students' perspectives. Since I was seated beside this camera, I frequently used it to pan different parts of the room and would use it to zoom in on specific students or groups. During lab activities, I would regularly detach it from the tripod and walk throughout the room, often talking with students, in order to better record what students were doing and saying. Although the presence of the camera could construct a barrier, the students seemed to grow very comfortable with it and appeared to speak similarly to me whether I did, or did not, have the camera in my hand during a conversation.

²³ Several factors, such as the way I dressed, the fact that Mrs. Kinsey and the students referred to me as "Mr. Glasser" or "Mr. G," and that I was closer in age to the teachers than the students, might have led students to see me as more like their teachers than like themselves. Again, this topic will be discussed in more detail in Chapter 3, specifically in the section, "Me, The Researcher."

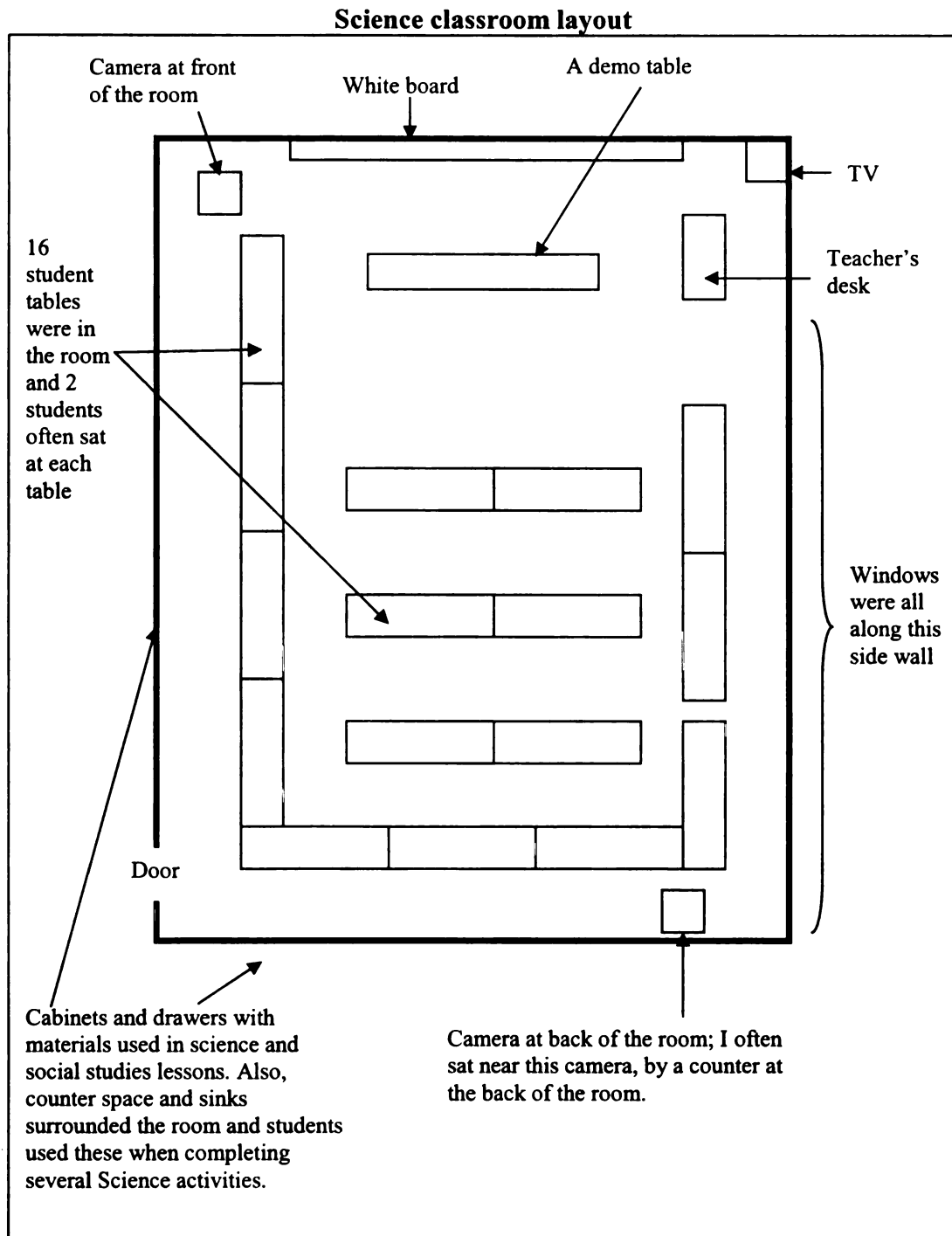


Figure 1: Layout of the science classroom at the start of the school year, including selected data generating tools. It is not drawn to scale.

The camera that was at the front of the room captured the front of many students' faces and provided a view that more closely represented some of what Mrs. Kinsey saw throughout the class period. Since I was not seated beside this camera, it was not moved as often as the one in the back of the room. Instead, it was regularly fixed on a central part of the class in order to capture the most students in its view or it would be focused on a specific group of students, typically during lab activities.

As for the audio recorders, I made use of two digital recorders that were regularly placed far apart in the room. One would sometimes be put on a table near the front of the room while the other one would be closer to the back of the room. Although these recorders remained untouched and captured classroom happenings throughout many lessons, students were told that they could hold them and speak directly into them during breaks. As a result, they often used them as places to gossip or record their singing voices and impressions. When these devices proved distracting during class, Mrs. Kinsey would ask that I move them to different tables or shut them off, which I did²⁴.

Data Generated

The preceding sections provided an overview of my time at the school, an explanation of how and when data tools were introduced to participants, and a discussion regarding where I, and other tools used to generate data, were located throughout the room. This "Data Generated" section provides more details regarding the different data

²⁴ Both video cameras and audio recorders were positioned so as to primarily generate data for students who were participants in this study. No student's seating was purposefully changed as a result of her or his decision to, or not to, participate in the study; however, since the classroom was a dynamic space, some students who did not agree to participate were accidentally captured in some video and audio data.

sources: field notes, videotaped and audiotaped lessons, students' work and classroom artifacts, and interviews.

Field Notes

Each day at the school, I generated field notes of my observations and interactions. The bulk of these notes were recorded in a table with three columns: time, descriptive observations, and analytical/personal reflections²⁵. "Time" noted approximately when different events transpired. "Descriptive observations" contained detailed accounts of happenings without purposefully recording comments of my interpretations of these events. The third column, "analytical/personal reflections" was where I recorded my thoughts on various events, including questions I had or interpretations regarding why something happened or what it might suggest about particular participants or the lessons that were being presented.

Additionally, for events that transpired outside of class time, such as during lunch, before school, or after school, I recorded notes that described these interactions as well as my interpretations and questions regarding them. Electronic files were created that contained notes from my visits to the school before the school year and notes from my introduction to, and subsequent conversations with, each adult participant before, during, and after the first marking quarter. In total, I have compiled approximately 1,200 pages of these double-spaced notes, which provide a wealth of information. They remind me of thoughts I had at different times, such as some early impressions of classroom events and various participants.

²⁵ This general structure for field notes agrees with how other academics have suggested record researchers record field notes (e.g., Glesne, 2006; Purcell-Gates, 2004).

Reading and writing these documents the day events transpired enabled me to reflect on happenings while they were fresh in mind and provided some ideas for what I might attend to the following days and how I might alter some of my methods (e.g., interview questions). Reflecting on them later transported me back to my thinking at the time they were written while also enabling me to have a more distanced perspective, often enhanced by reading multiple recordings of notes (or reviewing related video or audio data) that were generated at different points in time. As a result, these historical documents have been incredibly helpful in my analyses and have enabled me to see events from multiple times and perspectives.

Videotaped and Audiotaped Lessons

As noted earlier, I made use of two video cameras and two audio recorders in many classroom lessons. The video cameras were occasionally moved during a lesson in order to better record certain participants, comments, or behaviors that seemed especially interesting to me. Although no rigid preset criteria were established to evaluate what would be deemed “interesting,” I was drawn towards events that seemed to provide much information about participants’ relationships with others and the content. Therefore, I often focused on students’ interactions with peers and their teacher during lessons and on the teacher’s behaviors when she spoke with students and introduced new curriculum materials or activities.

Likewise, the audio recorders were placed in different places in the room and were occasionally moved so they would better capture verbal instructions that were provided, students’ interactions during lab activities, or students’ non-academic

conversations and behaviors when they seemed unengaged in the lessons. In total, more than 45 hours of video data and 60 hours of audio data were recorded from the classrooms.

Students' Work and Classroom Artifacts

To generate a more thorough understanding of these single-gender classes, the specific participants involved in this study, and the science that was introduced, I examined the students' work and classroom artifacts. Since Mrs. Kinsey was a long-term substitute, she wanted the class to be prepared for Ms. Small's return and tried implementing the same lessons that Ms. Small had used in the past. Since she was unable to get access to Ms. Small's computer files²⁶, she relied on copies of activities, handouts, assessments, and other curriculum materials that other teachers gave her. The teachers acknowledged that these materials matched what Ms. Small followed and Mrs. Kinsey subsequently provided me with photocopies of many of the files that she was given. As a result, I obtained a copy of the science packet students received the first quarter²⁷ and most of the labs and assessments they completed during this time.

During my time at the school, Mrs. Kinsey supplied me with students' grades on assignments and their grades at the end of the first marking quarter. I photocopied students' graded worksheets and assessments so I could better analyze individual students' behaviors and Mrs. Kinsey's approaches to grading over several assignments, if I wished to do so in the future. After the end of the first marking quarter, I no longer

²⁶ These files were password protected and Mrs. Kinsey was not given access to them.

²⁷ Students rarely used a set of classroom textbooks and did not take any science books home. Some class time was spent having them read a handful of pages silently, or aloud as a class, but the vast majority of lessons and activities this quarter came from this packet.

photocopied students' work but continued to receive students' grades at the end of different marking quarters. Due to some difficulty with the school's computerized system, Mrs. Kinsey was unable to send me students' second quarter grades but successfully supplied me with their grades from the final two marking quarters.

Interviews with the Teachers, Students, and an Administrator

Among the 62 students who were part of this team when the semester began, all 30 girls and 28 of the boys consented to being videotaped and interviewed. I interviewed 19 girls and 20 boys, most of them multiple times. At students' request, I interviewed them in groups of two or more and mainly interviewed students from the same class together. Additionally, I interviewed Mrs. Kinsey, Mrs. Frost, and Principal Davis multiple times in a one-on-one format. In total, I generated 1,000+ minutes of student interview data, 450+ minutes of teacher interview data, and 80+ minutes of interview data with Principal Davis.

All interviews were videotaped²⁸ in order to obtain a more accurate record of what participants said and did. Videotaping made it easier for me to decipher and transcribe people's comments, especially when multiple people were interviewed together. Another major benefit of recording these interviews was that it allowed both me and interviewees to speak more comfortably and casually since I did not have to busily record information during the conversation. In my opinion, this format helped the interviewees be more relaxed and led the exchanges to be more conversational – and less like a formal interview – than if I attempted to record notes during our discussion.

²⁸ I also recorded them with an audio recorder in case there were any problems with the video equipment.

The interviews were semi-structured in that I made use of an “Interview Guide” (see Appendix B). The initial list of questions was generated using many of Cannell and Kahn’s (1953) recommendations for interview questions²⁹. For example, these questions aimed to address my research objectives, were phrased in what I believed was the language of my participants, and were not purposefully “loaded” or phrased in ways as to imply that a certain response was favored more than other responses. Although I sought to avoid question that would elicit a “yes” or “no” response, I tried wording questions in a format that seemed comfortable and familiar to my participants based on my informal conversations with them (Purcell-Gates, 2004). Therefore, although some initial questions led to “yes” or “no” responses, follow-up questions (e.g., “Why?” or “What do you mean?”) asked participants to explain their reasoning and provide more insight into their initial response.

The conversations did not follow a rigid script, but I asked participants many similar questions in order to better ensure that the generated data addressed my research questions and could be analyzed across participants. Conversations were allowed to deviate to other topics, especially if they seemed generally related to the aims of this study. The open nature to these conversations led me to add additional questions to the guide as the study unfolded. These additional questions were based on events that transpired in class (e.g., why and when certain approaches to classroom management were followed), comments raised by various participants (e.g., what does “drama” mean to them and describe the drama that takes place in class), or unique elements of the

²⁹ Not all of the questions in the Interview Guide were thoroughly analyzed during the writing of this dissertation as some questions were less relevant to the particular research questions being addressed in this study. Some of the questions and responses could be analyzed in more detail in the future.

school that came to my attention as I became better acquainted with the environment (e.g., questions surrounding a particular elective offered at the school).

As seen in Appendix B, the questions in this guide differed for Principal Davis, Mrs. Frost, Mrs. Kinsey, and students given that they each occupied distinct roles in the school, classroom, and study. The following sections will provide additional information about the interviews for different participants³⁰.

Principal Davis

I interviewed Principal Davis twice during the school day and Appendix B contains 10 questions I asked her, many of which contained additional related questions that built off the initial one asked. These interviews took place one month apart from each other and were held in her office. In total, these conversations exceeded 80 minutes and focused on several topics including why the school decided to have all-girl and all-boy classes, why these classes only existed in one team, how students were placed onto the team, and ways these classes' "effectiveness" had been assessed, if at all.

One interview question focused on background information regarding the school and specific students who were participating in this study (e.g., a demographic breakdown of the student body and faculty as a whole and by grade in terms of race, sex, and number of students who qualified for free or reduced-fee lunch). Principal Davis was unable to compile this information during my time at the school but she supplied me with

³⁰ Some participants also engaged in video recall where they watched selected portions of past lessons. For students, some of these clips contained classes they had never seen (e.g., boys watched some clips of the girls' class). With many of these clips, participants were told to simply tell me what they saw or anything that came to mind. Other clips were accompanied with more directed questions. Time constraints and technological concerns (e.g., difficulty recording participant responses over the sound of the replayed clips

many of these details through e-mails exchanges after the end of the first marking quarter.

Mrs. Frost

Mrs. Frost was interviewed in her classroom during her prep period and after school on two occasions. These conversations took place approximately three weeks apart and totaled slightly more than 2 hours in length. Appendix B lists 25 questions for her, along with many additional related questions. Through these conversations, she provided information concerning her background with teaching both coeducational and single-gender classes and discussed why these single-gender classes were initiated, any concerns she might have with them, and training she had experienced that helped her teach these classes.

The interviews covered a variety of topics, including how she taught the all-girl and all-boy classes, and how students behaved in them, asking her for similarities and differences between the two classes. After the end of the first marking quarter, Mrs. Frost and I exchanged several e-mails aimed to generate more data and to clarify or confirm some details she had provided during my time at the school.

Mrs. Kinsey

Over a span of six weeks, Mrs. Kinsey was interviewed on six separate days. These conversations took place in the science (and social studies) classroom and were done during her prep period and after school. In total, these conversations exceeded 5.5

themselves), led me to abandon this means of generating data after several attempts. This data might ultimately be revisited or analyzed in more depth in the future.

hours and focused on a large number of topics. Appendix B lists 47 questions that were included in the compiled interview guide, many of them containing additional related questions. The interviews provided me with information concerning her background with teaching, science, and single-sex education. She was also asked if she had heard or read anything about gender differences in science and science education.

Although she had just joined the school that year, I asked her why the school had all-girl and all-boy classes and sought her opinions of these classes at different times of the year. Through our conversations, she described how she saw her science classes, including ways the sections were similar and different from each other, and how she would describe them to a new student. She noted her opinions of the boys' and girls' behaviors she observed, also telling me what behaviors struck her as disruptive to her teaching and to students' learning. She was asked to describe her teaching style and the reasons she followed certain procedures, including when she would give a student a detention and when she would tell students to place their heads down on their desks.

After the end of the first marking quarter, Mrs. Kinsey and I remained in regular e-mail contact about this study and spoke by phone several times. As noted earlier, she sent me students' grades for the third and fourth marking quarters. She and I continued to talk about her experiences in the classroom and her developing opinions of her classes and single-sex education. Although these conversations were not videotaped, I recorded notes for these discussions that contained statements of what she said as well as my initial interpretations and reactions to this information.

Students

Interviews with students took place either in an empty teachers' office or in a stockroom during two periods of the day: lunch and "SRT," which was the acronym for "Student Reference Time." Students who did not have to meet with teachers or complete missed or late assignments during SRT could be interviewed then. Most students were interviewed in groups of two, although several groups were larger and a small number of interviews, or portions of interviews (e.g., before another student returned from the lunch line³¹) were one-on-one. Students were typically interviewed over two or three days in order to get through as many questions as possible. On average, both periods afforded us approximately 20 minutes to talk each session and, in total, almost 17 hours of student interviews were generated.

As noted earlier, I interviewed 19 girls and 20 boys, even though 30 girls and 28 boys consented to being interviewed. Time and logistical constraints led me to be unable to interview all the students who agreed to participate in interviews (e.g., if they had to meet with teachers during lunch or SRT they could not talk with me during those periods). However, I was very pleased with the number of students who were interviewed as it exceeded my initial expectations. When proposing this study, my stated goal was to engage in purposive sampling and interview 1-2 "high-performing," "low-performing," and "average" students, as labeled by the science teacher, from each of the two sections (Purcell-Gates, 2004).

Mrs. Kinsey was aware of this design and when I started interviewing students, beginning the fourth week of the school year, she told me several students she felt

³¹ Students who needed to get food from the lunch line (i.e., they did not bring their own lunch) were allowed to skip to the front of the line on days they spoke with me.

confident she could place into these categories. She largely made these designations based on students' grades. All of the students she suggested were interviewed and I then had flexibility in interviewing additional students. In an effort to better approach representative sampling, I consciously tried interviewing students who represented the diversity in the classes, including students of different races, students who were rarely, if ever, reprimanded for their behavior, students who seemed to be reprimanded many times, students who seemed to have many friends in the class, and students who seemed to have few friends in the class (Purcell-Gates, 2004).

Appendix B notes 32 questions, along with many related questions, that were for the students. These questions covered a variety of topics including a self-assessment of them in science, a stating of any science activities they did outside of school, and their goals for what they would like to do after they finished with school. Regarding the single-gender classes, they were asked why they thought the school had single-gender classes and what reasons they were given for why these classes existed. They described how they felt about being in all-girl, or all-boy, classes and to name the best and worst things about being in single-sex classes (as well as the best and worst things about having members of the "opposite" sex in their classes). Additionally, they were asked to describe their teachers and science class as though they were talking to a new student who would be joining their team the following week. Students discussed ways they thought their science class was similar to, and different from, the other single-gender science class taught by Mrs. Kinsey. They also made comments regarding how they thought their all-girl or all-boy science class was similar to, and different from, other science classes in the grade and other science classes they had taken in the past.

Analyses

Engaging in an ethnographic qualitative study, a sizable amount of data was generated. The following sections explain how a grounded theory approach assisted in my analyses of this data and coding I performed. It also discusses issues related to validity and generalizability, which are important topics to be attentive to in any research study.

Grounded Theory

Grounded theory aims to empirically ground an emerging theory in data that connects with other theories and research (Corbin & Strauss, 1990). This approach seemed like a good match for this study because I did not enter the site with specific hypotheses or claims that I hoped to prove or disprove. Instead, I believed claims and theory might be developed inductively from the data that was generated and I would not consciously strive to push analyses so the data would support a specific pre-selected outcome.

Corbin and Strauss (1990) explained several principles of grounded theory that are valuable to note. One, they explained that phenomena are not static but continually change and that change should therefore be built into the methods that are employed. Similarly, they noted that, “analysis begins as soon as the first bit of data is collected...[and] it is used to direct the next interview and observations” (p. 6). Essentially, these two points highlight the perspective that data generation and analyses are interrelated processes. As additional data were generated, my methods often changed

in response. For example, when one room of students was told to place their heads down when they seemed to be loud I became more attentive to these events. I was more conscious of recording when these events transpired, what preceded them, and how participants responded. Additionally, I added interview questions related to these events such as a question asking the teacher why and when she has students place their heads down on their desks.

These instances, and the data generated from these revised methods, served as potential codes for generating responses to my research questions. They were marked in my field notes with specific letter codes and participants' comments that related to these events were also given the same code. If video data existed for these events, those times were marked with the same letter code(s) and these data were reviewed to generate additional descriptive details and to look for differences and similarities across multiple related incidents. These codes suggested ideas about the culture of the classes, the image that was constructed regarding who boys and girls are, and participants' perspectives of this single-sex program. Collections of codes led me to group data into different categories that would enable me to construct responses to my research questions and develop some emergent theory that agreed with the data that had been generated in this particular setting. Appendix C contains a list of many of my initial codes and goes through an example to explain how I went from the raw data to specific results reported in this dissertation.

Codes allowed me to collect key data under a similar heading but grounded theory required me to make use of "constant comparisons" before moving too quickly to seeking a theory (Corbin & Strauss, 1990). As noted above, this process led me to compare

incidents against other incidents for similarities and differences. Such comparisons guarded against bias by requiring me to assess whether new events could be coded similarly with other incidents. Related to this benefit was that these comparisons enhanced the precision in my analyses because they occasionally led me to sub-divide initial codes or categories. For example, when a participant explained that single-gender classes were desired because they would stem the amount of sex talk in which the students engaged, future comments clarified that this concept was comprised of two distinct reasons: one, sex talk should be curbed in order to increase students' focus on academic content, and two, sex talk should be curbed because middle school students are too young to engage in this type of behavior.

Additional Notes Regarding the Coding and Analyzing of Data

Although many codes were constructed as a result of the approach described above, some more directed coding practices were also employed. For example, given that this dissertation involved an ethnographic qualitative study of single-gender classes, I wanted to take readers into the setting and experience some of what I and other participants experienced. Ethnographers seek to understand and describe human behavior in more naturalistic settings, as opposed to laboratory settings, so they often tend to devote a sizable amount of space to descriptions of context (Purcell-Gates, 2004). Therefore, I coded specific information, such as demographic information about the student body and faculty, the layout of the building, and things I noticed around the classroom and building, with a "context" label. These pieces of information from my field notes helped construct a more detailed description of the setting.

Codes were compiled in an MS Word document and many of the events and descriptions were similarly entered into Excel spreadsheets. These files enabled me to easily sort and review data that matched specific codings. Similarly, I initially marked participants' responses to related interview questions with the same code and subsequently inductively coded them according to newly devised codings and sub-codings that developed during my analyses (see Appendix C for more information). For example, participants' responses to the question asking why the school has single-gender classes were first given the same code and read together. Their responses were then further divided and coded according to sub-codings based on the reasons they provided.

As claims began to appear in these analyses, I engaged in more "selective coding" in which categories that needed more information were filled-in with descriptive detail (Corbin & Strauss, 1990). During this phase, I occasionally returned to participants with specific questions that aimed to provide me with a more detailed picture of the category and strengthen my confidence in how I presented my interpretation of information that was provided by participants.

The above paragraphs introduce readers to methods I followed in coding and analyzing data. Additional information regarding the coding and analyzing of data, such as how I coded discursive interactions as "instances of argumentation," will be described as necessary in the following chapters. One additional note about my coding practices concerns how quotes from video and audio data are presented in this dissertation. The format used for citing the data is (FileName³², Time in the file when the quote appeared). An important note is that all file names that refer to data generated with a video camera

contain the “.mp4” extension while all file names that refer to data generated with an audio recorder contain the “.DSS” extension.

Validity

My coding and analyses led me to develop claims that addressed my research questions; however, it is possible to use data (both qualitative and quantitative) to support multiple interpretations of interactions, context, and phenomena. Not all interpretations are equally credible or legitimate and I sought to minimize the number of inappropriate conclusions that were drawn from the data. As Purcell-Gates (2004) explained, “Validity in ethnographic research refers to the degree to which one’s data and interpretation correspond to the ‘way it is’ within the phenomenon being investigated” (p. 98). In order to enhance the validity of my data and interpretations, I sought to make use of “location,” triangulation, purposeful searches for disconfirming and confirming evidence, and informant checking.

Purcell-Gates (2004) explained that ethnographers impact their data, analyses, and other aspects of their studies, and quoted Dobbert (1982, p. 6) as writing that “location” involves, “making clear one’s theoretical, methodological, and personal preferences and biases to the extent that they may affect research processes and outcomes” (pp. 107-108). This process of “location” can improve a study’s validity by leading researchers to clearly state their subjectivity in approaching the research problem and letting readers know more about a researcher’s background, biases, and perspectives. A number of my

³² Each “FileName” for data generated in an interview is briefly abbreviated from the name of the actual electronic file. The actual electronic file is preceded by the characters “Interview_” but I have eliminated this consistent phrase from each parenthetical citation.

views were initially introduced in Chapter 1 in an effort to present readers with this information about me.

Additionally, I sought to enhance validity through triangulation, which involved using multiple data sources to confirm and strengthen claims (Erickson, 1986; Purcell-Gates, 2004). Codes applied to some form of data (e.g., interviews) were compared and analyzed alongside data generated from other sources (e.g., field notes and videotaped class periods) to seek confirming and disconfirming evidence in order to strengthen or weaken any developing claims. Single incidents that supported or opposed possible claims were not deemed sufficient to verify or discard a hypothesis. For claims to be viewed as increasingly plausible, they needed to be supported multiple times from different sources.

As claims became more clearly defined, I engaged in purposeful sampling in an effort to see if specific results were isolated to certain incidents. Similar to my comments regarding triangulation, I sought confirming and disconfirming evidence in the generated data to strengthen or weaken claims (Corbin & Strauss, 1990; Erickson, 1986). Such efforts aimed to prevent me from accepting interpretations without double-checking that evidence might disconfirm possibly biased findings (Purcell-Gates, 2004). Additionally, these actions might have helped guard against me seeing only what I expected or wanted to see (even if these expectations or wants were not clearly defined or known to me). Through these searches, I occasionally discovered nuances and variation among the data that pushed me to contemplate modified claims and led me to reanalyze data with new insights.

One additional means I sought to employ in an effort to enhance the validity of the data and analyses was to engage in informant checking. As a result, I wanted to share evolving interpretations of the data with participants in order to ask for their reactions and perspective. Those individuals who wanted to talk with me about my writing would also be invited to speak with me about the work I had completed. I have supplied Principal Davis, Mrs. Frost, and Mrs. Kinsey with some of the analyses that have been performed, but they seemed too busy during the school year to provide much feedback. I want to pursue this option further after the dissertation has been “completed,” but before converting it into pieces that could be published elsewhere. My hope is to ask for their feedback and to assess whether they believed the descriptions and other elements were accurate. They will be asked to add their own response(s) or piece(s) of writing based on the study or writings. In addition to having these adult participants review the data and analyses, I also wish to ask student participants to engage in informant checking. This process might require some coordination with the school itself but I will see if something can be arranged during the school year.

Generalizability

Although the section above focused on enhancing the validity of my data and interpretations, I do not believe that there is only one correct “objective” view or interpretation of events. This perspective is shared by a number of researchers (e.g., Maxwell, 1992; Purcell-Gates, 2004), and posits that validity does not depend on the existence of an absolute truth or reality. It is not the data that is valid or invalid, but it is the inferences that are drawn from them that must be judged as valid or invalid. As a

result, claims made in this dissertation constitute interpretations that are deemed valid through the methods and analyses I pursued, but they need not be rigid truths that would have been similarly reached by all researchers.

Regardless, my results can be assessed as a valid means to interpret this setting and can contribute to the dialogues that surround single-sex education. The study did not aim to make universal claims, nor does my epistemological stance lead me to believe that such a result is entirely possible. Purcell-Gates (2004) noted that ethnographic studies are not designed for generalizability of results and instead of seeking to generalize the results, readers should consider how the results from a study could apply to their own, or alternate, situations.

I initially sought localized knowledge and particularizability rather than generalizable knowledge (Denzin & Lincoln, 2005; Erickson, 1986). The rich descriptions and claims enable theories to be generated surrounding the phenomena explored and enable readers to engage in “case-to-case” generalizing from my research site to other settings (Firestone, 1993; Maxwell, 1992). With grounded theory, researchers specify the conditions under which a phenomenon has been discovered and they supply practitioners and other people with ideas regarding a range of situations where these outcomes might occur (Corbin & Strauss, 1990).

CHAPTER 3: PARTICIPANTS

As with any research project, the participants involved in this study greatly impacted the results that were generated. This section introduces participants according to seven groupings, where each grouping contains one or more individuals or institutions. Employing the use of groupings as a means to discuss participants could suggest the existence of clear divisions among participants; however, that is not what I wish to imply. Instead, in accordance with my conceptual framework introduced in Chapter 1, I view different actors who were involved in the study to be interconnected and not wholly divisible from other actors. The groupings are presented as a convenience in order to assist in providing initial descriptions of people and groups involved in this work. More information about them and their relatedness to the other groupings will be introduced in future sections of this dissertation. The seven groupings are: (1) P.D. James Middle School, (2) Principal Davis, (3) Mrs. Frost: Language arts and mathematics teacher in this single-gender team, (4) Ms. Small: Science and social studies teacher in this single-gender team, (5) Mrs. Kinsey: The long-term substitute teacher for Ms. Small, (6) the single-gender classes, and (7) me, the researcher.

P.D. James Middle School

I first visited P.D. James Middle School during the 2006-2007 school year and observed classes, spoke with the two teachers who led and initiated this single-gender team, and talked with the principal. The school serves grades six, seven, and eight, and each grade is divided into several teams. Academically, the school has done well in

accordance with No Child Left Behind (NCLB) regulations. The school, as a whole, has consistently met Adequate Yearly Progress (AYP) targets each year, except for the “special education” subgroup which did not meet AYP in English Language Arts in 2003, 2004, and 2006. Due to the scheduling concerns, no “special education” student, meaning a student with an Individualized Education Program (IEP), was part of the single-gender team in the school.

At the start of the 2007-2008 school year – when the study took place – P.D. James Middle School had 941 students (47.6% female). According to Principal Davis, the student body was diverse in terms of families’ socioeconomic backgrounds. She explained that some students were from upper-middle class households and lived by the lake, while she labeled other students as being from lower-middle class families who lived in the nearby cottages. Of the 941 students, 220 (23.4%) qualified for free, or reduced fee, lunch. Racially, the student body was less diverse as 827 (87.9%) were listed as “White.” Similarly, the faculty was predominantly female and White. Of the 38 faculty members teaching the core classes in these three grades, 32 (84.2%) were female and 34 (89.5%) were “White.” A more detailed breakdown of the race and sex of the student body and faculty can be seen in *Tables 1-3*.

Racial breakdown of the student body					
	White	Black	Hispanic	Asian/Pacific Islander	Other/ Unknown
Number of students	827	50	40	21	3
Percentage of student body	87.9%	5.3%	4.3%	2.2%	0.3%

Table 1: Racial breakdown of the student body at P.D. James Middle School at the start of the 2007-2008 school year

Racial breakdown of the faculty					
	White	Black	Hispanic	Asian/Pacific Islander	Other/ Unknown
Number of faculty	34	12	0	2	0
Percentage of faculty	89.5%	31.6%	0%	5.3%	0%

Table 2: Racial breakdown of the faculty at P.D. James Middle School at the start of the 2007-2008 school year

Breakdown of the student body and faculty by sex		
	Female	Male
Number of students	448	493
Number of faculty	32	6
Percentage of student body	47.6%	52.4%
Percentage of faculty	84.2%	15.8%

Table 3: Breakdown of the student body and faculty at P.D. James Middle School, at the start of the 2007-2008 school year, in terms of sex.

This particular study primarily focused on one team within the seventh grade. During the year of this study, the seventh grade at the school contained three distinct teams of teachers that taught students language arts, mathematics, science, and social studies. Two of these teams had separate teachers for each of these four disciplines. The third team, which had a little more than 60 students, consisted of two teachers: Mrs. Frost taught both language arts and mathematics and Ms. Small taught science and social studies. This team was the only one in the school that had single-sex classes, or what school personnel called “single-gender classes,” that year. The reasons these classes were initiated, and why Mrs. Frost and Ms. Small pushed for them, will be discussed briefly later this chapter in the “The Single-Gender Classes” section and in more detail in Chapter 4.

The building, school day, and surrounding community

P.D. James Middle School was situated near a residential middle class community and had several athletic spaces on the property, including tennis courts, fields for football/soccer and baseball/softball, and a track. A high school was across the street and a police station, firehouse, and the township's Parks and Recreation Department were all less than one-half mile away. Although the street outside the school had a slow, but steady, stream of cars, most stores and commercial businesses were more than one mile away and students remained on school property throughout the school day, except for the occasional field trip.

I did not notice any contemporary features in the school's physical plant and it struck me as a building that was built around the middle of the 20th century. It was a one-story building that had different hallways for each of the three grades, as well as other spaces for computer rooms, a library, and a lunch area. When entering the building, a visitor would turn left and walk down a hallway, passing some resource rooms and display cases showing pictures of different sports' teams and athletic awards won as well as the names of faculty members in the school, before coming to the main hallway and main office. It was in this office that I would sign-in each morning, affix my visitor badge, and walk to the seventh-grade hallway.

The school day itself was from 8:05am until 2:45pm and was divided into nine chunks. As seen in *Table 4*, the average class period for seventh-grade students (excluding lunch and SRT) was approximately 53 minutes, with third period being divided into two portions. For the students and teachers in this study, the periods marked 1, 2, 3, and 4 were when the four core subjects of language arts, mathematics, science,

and social studies were taught. “SRT,” which was the acronym for “Student Reference Time,” struck me as a combined homeroom and study hall. During SRT, announcements would be delivered and students could get passes to see other teachers to complete missed assignments or tests. Periods 5 and 6 were when other classes, such as gym and electives, met for the seventh-grade students. Since all seventh-grade faculty members taught an elective class during 5th period, 6th period was their prep period.

Schedule For Seventh Graders	
Period	Time
1	8:05-9:00
2	9:04-9:57
3	10:01-10:28
Lunch	10:33-10:55
3	10:59-11:24
4	11:28-12:22
SRT	12:26-12:51
5	12:55-1:48
6	1:52-2:45

Table 4: Schedule for seventh-grade students at P.D. James Middle School

The structure of the school day possibly contributed to students and faculty seeming rushed, as they hurried from class-to-class or tried preparing for a new group of students who were entering the room just as the previous group was leaving. This schedule also led many teachers to keep to themselves, as they often remained in their individual hallways and oftentimes their own rooms the entire school day. Occasionally, two or three teachers sought to use the photocopier at similar times (usually their prep period) and would chat informally there, or they would talk during faculty meetings and little gatherings that took place in various classrooms, but these seemed rare to me. On my first day at the school, one teacher, Mrs. Frost, brought me to the “faculty room” during lunch and told me I could eat there during the students’ lunch period. Although all

seventh-grade faculty had lunch at the same time, I sat alone the entire period and ate by myself. Afterwards, I was informed that most teachers spent those 22 minutes in their own rooms, typically preparing for later classes, doing some grading, meeting with students, or relaxing. As for me, I spent future lunch periods eating in the science (and social studies) classroom, interviewing students, or eating lunch with students in their lunchroom.

The students' cafeteria was much like many aspects of the school building: utilitarian without much pizzazz. Those who purchased or received a free lunch entered the kitchen area through one of two long lines streaming down opposite sides of the same hallway. The kitchen separated two places where students could eat their lunch. After taking some students most of the 22 minute period to get through the lunch line, they often sat with peers around circular or rectangular tables. Although I did not formally study students' seating arrangements or preferences during lunch, and I was only present in the cafeteria several lunch periods, I was struck by the casual observation that many tables seemed to consist almost entirely of boys or of girls. Furthermore, the tables also primarily contained White students or students of color. Therefore, tables could implicitly be labeled according to the predominant sex and race of the students who sat there (e.g., there were tables of predominantly White female students and tables of predominantly African-American male students). Since I did not do any precise counts, I am not certain how strongly such divisions existed. But given my areas of interest, I was at least peripherally attentive to their seating and noticed that more students broke the "color barrier" than the "sex barrier." By this comment, I mean that I saw more male students of color than female students (of any race) at a table of predominately White males. As a

result, sex might be a more critical label than race for the constructed identity of these lunch tables and for students who were deciding where to sit³³.

The walls of this cafeteria, like many of the hallways in the building, were a dull white color. Some halls contained students' paintings, and these images often showed individuals doing different things such as kicking a soccer ball or holding books. Although these paintings added some variety to the otherwise bland-colored halls, the images struck me as old, especially given the haircuts and clothes seen on the painted people, and the colors were beginning to fade or chip away.

Although the building itself seemed dull, the students added a great deal of life and energy to the space through their impassioned conversations, arguments, or laughter, their frequent outbursts of physical activity and running around, and the drawings or notes regularly found on the floors or attached to lockers. In the seventh-grade hallway, where I spent the majority of my time, lockers lined both sides of students' path such that the space often became congested with bodies and the sound of students' voices overlaying atop one another. Although I did not follow students through their daily schedule, and mainly remained fixed inside the same classroom, I saw their eagerness to get into the halls and away from the classrooms and desks. The students seemed hurried between classes and during lunch, but made the most of these social moments where they had great freedom, more than in their classes, to be beside peers of their choosing and engage in more varied discursive behaviors (e.g., talk louder, say more offensive comments, flirt more gratuitously, and talk more comfortably about a wider range of topics – almost as though they felt like they were less under someone's "watch" during

³³ As noted, these informal observations could be interesting to study more formally and there might be different seating choices made by those students who were in single-gender classes compared to those

these moments). Teachers often stood in the halls, reprimanding students whom they viewed as behaving inappropriately or those who were late to their next class.

To some people who have heard me discuss this school, my descriptions have sounded similar to many schools, in terms of the students and building³⁴. Although a part of me would like the school and student body to sound distinct, as though doing so might be easier for readers to envision and distinguish this site from other ones, another part of me is pleased that this setting, with the currently rare single-gender program, does not come across as an entirely unique place.

Principal Davis

The 2007-2008 school year was Principal Davis' third year as principal at P.D. James Middle School and third year as a doctoral student in a nearby institution's Educational Leadership program. Before working as an administrator, she had been a mathematics and science (chemistry) teacher at both the middle school and high school levels. She subsequently served as the Assistant Principal at a high school in the district, before becoming the principal at P.D. James Middle School.

Although she liked working with students of different ages, she claimed to greatly enjoy middle school students because "they're easier to deal with." She explained that she found them "easier" because "when they get into trouble the issues aren't as severe...[In high school] they start doing more adult-like things. You know, drugs and other sorts of activities that get them into trouble. The consequences are more severe."

students who were in coeducational classes.

³⁴ One person casually referred to it as "the dead building, lively student disconnect," which seemed fitting to me and led me to acknowledge that I had been in many schools that appeared to fit this simplified description.

She noted that P.D. James Middle School had experienced “a few events but nothing serious” and expressed her belief that almost none of these middle school students engaged in drug use or other “adult-like” activities, including sexual behaviors (Admin_10.01.mp4, 1:58-3:43).

There was clearly some tension between her and her faculty. Although she regularly spoke positively of the students and faculty, several faculty members voiced concerns regarding her. The repeated comments focused on her leadership, claiming she was unorganized and made commitments that she did not keep. Although my relationship to her differed from those of the students and faculty, I saw similar behaviors in our interactions. She would make promises about sending paperwork or information, but would not follow through. It took several additional messages, sometimes weeks or months after she had agreed to provide me with something, before she would reply or reschedule. As a researcher who was not part of her staff, I expected to be a relatively low priority, but my experiences seemed to echo those expressed by some teachers and might not be (solely) attributable to my position as a researcher.

These teachers also felt she was removed from much of the daily events that transpired in the school, as they said she was rarely seen outside the main office during the school day. During my time there, she did not observe any of the single-sex classrooms and I only saw her interacting with students at a middle school football game, held at the nearby high school. Although some of these descriptions might seem unrelated to a study of a single-gender program, other teachers and administrators have told me that they believed administrators’ role in the school, especially their relationship with faculty and views of single-gender education, greatly affected their school’s single-gender

offerings (e.g., Mathematics teacher at middle school C, personal communication, March 9, 2007; Principal at elementary school F, personal communication, March 12, 2007). As a result, information on Principal Davis' relationships was introduced in this section and some of her views regarding single-gender programs will be discussed below. As the head of the school, she was a very important person in this community.

Single-gender education

The single-gender team had been established before Principal Davis became principal of this school, but she continued to support the program. Although she explained that no data had been collected on the single-gender team, she used anecdotal evidence and her own impressions to conclude that it is “a wonderful program” and she encouraged other schools to “take that step forward and try it. I think it would be worthwhile for their staff and the students” (Admin_10.01.mp4, 35:20-36:09). She explained her belief that it had been a positive program, in part, because the teachers found leading single-gender classes to be an “enjoyable experience” and the students in this team “enjoy it” too (Admin_10.01.mp4, 3:43-6:23).

Additionally, she expressed a desire to expand the program to other teams and grades in the future (Admin_10.01.mp4, 24:38-26:04). She wanted the single-gender team(s) to continue indefinitely and said that, “It'd be lovely if we had a program that we could probably offer six through eight so that parents who may be contemplating going to private schools or even moving their child to another school district, they may choose to stay because of what we have to offer here” (Admin_10.01.mp4, 24:38-26:04). She

seemed to support this single-gender program, in part³⁵, because of her belief that supplying parents with the opportunity to have their children educated in a single-sex environment might lead some of them to be less likely to leave the district and opt to enroll their students in a private school or competing school district. She noted that there were at least five single-sex private schools nearby and several “schools of choice,” which had recently been reporting higher test scores than P.D. James Middle School, that students could possibly attend.

Her positive view of single-sex education also might have been influenced by her own positive personal experiences with single-sex schooling, specifically for her son. Her daughter, who was starting her third year at a nearby university, had gone to coed institutions her entire life, but her son, who graduated from college the previous spring, had attended a private all-boys high school from tenth grade onward (Admin_10.01.DSS, 36:00-38:00). She pulled him out of a coed school because of racial problems, specifically stemming from how some adults spoke with her, and she sought to minimize these stresses for her son. Principal Davis spoke flowingly of this all-boy environment, explaining it led students, “to focus, and the little shenanigans that you would see [in coeducational schools] were just non-existent. It was just wonderful” (Admin_10.01.DSS, 38:00-38:10). According to her, he enjoyed the school because he had initially been “quiet” and “timid” but “not having the girls there made a huge difference for him...[because] I think he was concerned about impressing them” (Admin_10.01.DSS, 38:55-39:05). She explained that the absence of girls enabled him to blossom and be comfortable and loud around his fellow boys. She claimed that he

³⁵ Chapter 4 will further discuss her reasons for supporting this program.

became so well liked that he was elected homecoming king (Admin_10.01.DSS, 38:40-38:50). Although she said, “I would really like to think that it [the single-gender program] really helped him” she acknowledged that “maybe he was going to blossom anyway,” even if she had kept him in a coed setting (Admin_10.01.DSS, 39:30-39:40).

When she and I spoke about my study, she expressed great support for the single-sex program and noted that this work could aid other schools, and other teachers within P.D. James Middle School, in starting a single-sex program. Unless specific questions prompted her to address possible drawbacks to single-sex environments, or concerns with the current program, she never acknowledged that there might be negative consequences to such a setup. For example, when asked if there were any drawbacks with single-gender classes, she mentioned that the students in these programs would miss the opportunity to “learn some strategies, or coping skills, that they would need to be successful in a mixed-gender setting” but that the students in the single-gender program at P.D. James Middle School were only separated during their core classes and not during their electives. As a result, she concluded, “we kind of have the best of both worlds” (Admin_10.01.mp4, 15:15-16:02). Overall, she expressed happiness with the program and seemed to think this dissertation would solely highlight positives associated with it.

Ms. Small: Science and Social Studies Teacher in this Single-Gender Team

When I first visited P.D. James Middle School in February of the 2006-2007 school year, I met Ms. Small and spent the majority of my day talking with her and watching her science classes. She struck me as a confident woman with excellent classroom management skills who ran a well-organized class. Principal Davis echoed

these sentiments as she described the two teachers involved in the single-gender program, both Ms. Small and Mrs. Frost, as people whose, “teaching styles, their classroom management styles...lend themselves to having students who are more on task” (Admin_10.01.mp4, 7:32-8:32). Similarly, students said they liked Ms. Small, but seemed not to want to test her limits for fear of the repercussions. They tried to remain on “good” behavior in her class.

Prior to the start of the school year in which this study took place, Ms. Small and I spoke several more times. The week before my study began, she mentioned previously unvoiced concerns with the project. She emphasized that parents would be concerned with this work, especially the videotaping and interviews, and strongly urged me to find another site. None of these issues were raised earlier, and I had already received consent from the principal, obtained approval from my institution’s review board on the study, and moved to a location near the school (and paid one month’s rent) in order to complete this project. These concerns had important implications for this project and I had not expected such a significant set of issues to be raised at that time.

Although Ms. Small might have had “real” concerns with this work, and she communicated them to the principal who then began to express new doubts about the project, the concerns changed again after the first day of the year, when Ms. Small was hospitalized. I am still uncertain if she had an idea about the severity of her condition when she raised her concerns to me, and if she were trying to warn and encourage me to look elsewhere to do my study. Regardless, she was diagnosed with a tumor and told the school she would need to be out at least six weeks. Her colleagues and principal said they had known nothing about this situation until right before the start of the school year.

Ms. Small's silence about her medical situation and treatment led people to speculate about the severity of her condition and when, or if, she would return. Although the tumor was diagnosed as malignant in late September, administration expected her to return on October 19 based on the date Ms. Small had given them. A few days before the 19th, a revised doctor's note said Ms. Small would return to teaching immediately after Thanksgiving. The week before Thanksgiving, the return date was changed to the end of March. Her colleagues and principal were unsure of the "true" status of Ms. Small's health, and the school community was shocked when she passed away, at the age of 43, in early December.

She was a well-known member of the school who spent her entire teaching career at P.D. James Middle School. Her first year there was the 1998-1999 school year. She was very active in the school community, serving as the faculty contact person for the teacher's union and coaching boys' and girls' basketball, boys' and girls' track, and volleyball (girls). Many students expressed having known her years before having her as a teacher, thanks to seeing her coach their brother or sister. Her impact on the single-gender team, and on the faculty, principal, and students who participated in this project, were evident in many of the comments that were raised, the lessons that were introduced, and the observations that took place. She and Mrs. Frost were the individuals most responsible for initiating this single-gender program, and more information about their efforts and perspectives will be discussed in detail in Chapter 4. Although she did not teach the students who participated in this study, her influence on the team remained present during the year. Throughout the fall, students and teachers regularly discussed

when and if Ms. Small would be returning and their feelings towards having her as a teacher.

They mentioned their impressions of her, and the image that had been constructed about her (and even the students who were new to the school were developing ideas about her). Jason and Steven said she was known as a “tough teacher,” such that students would know to be more respectful towards her than they were to many other teachers (10.03_Lunch.mp4, 15:45-17:50). Steven, a student who had just joined P.D. James Middle School that year, commented that the descriptions he had heard made Ms. Small sound like “Hulk Hogan” (10.03_Lunch.mp4, 15:45-17:50). Nevertheless, these students and others were excited to have her as their teacher, even if some students labeled her as “really strict” (10.03_SRT.mp4, 6:45-7:20). Kristen noted, “I know I want to meet her” and explained that she partially wanted to meet her because she was “tall” (10.24_SRT.mp4, 10:40-12:30). Although the students struggled to clearly articulate why they were excited to meet her, the fact that she was “tall,” coached many sports, and had an interest in athletics seemed appealing to many of them.

Additionally, prior to Ms. Small’s death, Mrs. Frost noted that it would have been “nice” for me to see Ms. Small teach because she was,

African-American and it would’ve been nice to see how that impacted the team...It would’ve been interesting to see too how those, how our African-American girls related to her...I think these girls might [behave differently with Ms. Small leading the class] because [she] is so great about treating everybody exactly the same. I think the girls might have really benefited from watching her

love these other girls and I think maybe it would've helped them spread it around a little bit (Mrs.F1_10.01.mp4, 1:05:06-1:07:22)

These statements provided more information on both Ms. Small and Mrs. Frost. Ms. Small's African-American identity seemed important to Mrs. Frost and the students, and Ms. Small herself mentioned it to me the previous spring, when I first met her. She noted that as one of the few people of color among the student body and faculty, she felt discomfort and almost left the school because of these feelings; however, she claimed that her feelings changed after one African-American boy told her that he was glad she was at the school because it was nice to see people in the building who looked like him. She used this story to explain her realization of how important it was that she remain at this school where there were few faculty of color.

Mrs. Kinsey: The Long-Term Substitute Teacher for Ms. Small

After learning of Ms. Small's hospitalization, I was unsure if this study would continue at P.D. James Middle School. Speaking with Principal Davis and Mrs. Frost, we decided that I would start the year in Mrs. Frost's classroom and could possibly transition into the science classroom if the long-term substitute were comfortable with having me there and after enough time had passed for the students and this new teacher to acclimate to their revised situation. It was during that first week of the school year that I met Mrs. Kinsey, the long-term substitute replacing Ms. Small while she was out.

According to Mrs. Kinsey, she got this position because she had been checking the "sub service" to see if there were any openings and she happened to learn of this position shortly after it became known. Talking with her that first week of the year, she

was not sure if she would be needed, or wanted, at the school after the end of that week. She was aware of Ms. Small's situation, but the school had not yet extended their request for her to be the long-term substitute³⁶. She was a relatively new teacher who had completed her pre-service program in December 2006, after having student taught in a third grade classroom. She worked the following semester as a long-term substitute teacher, in a language arts position at a high school, and spent the spring and summer looking for full-time positions nearby. When she did not obtain any full-time teaching jobs before the start of the school year, she opted to continue working as a substitute teacher until a full-time position was offered to her. Although her endorsements were in science and language arts, she was allowed to serve as Ms. Small's long-term substitute because Principal Davis said Mrs. Kinsey was a "qualified teacher" for the position because she had an endorsement in at least one of the disciplines that she would be teaching.

Mrs. Kinsey worked very hard to understand the content and lessons for her classes. Obtaining the position as a long-term substitute teacher, especially during the first week of classes and specifically given the amount of support she ultimately received, struck me as a very difficult task. Regardless, she was extremely dedicated to doing well, as evidenced by the time she would place into considering alternate seating arrangements, calling parents, talking with me and colleagues about concerns she had with students and lessons, and meeting with students during lunch or other periods to assist them with

³⁶ After Ms. Small's death, the school searched for a full-time teacher to fill her position. Mrs. Kinsey taught Ms. Small's classes the entire 2007-2008 school year and was ultimately hired as a full-time teacher beginning the 2008-2009 school year. She will teach science and language arts for this team since those are the two disciplines in which she has endorsements. Mrs. Frost is qualified to teach the remaining core classes and will therefore switch to teaching mathematics and social studies for this team.

assignments. I was awed by her handling of this unique situation and some of these impressions were even evident in the notes I recorded after first meeting her, where I wrote, “She seemed surprisingly non-frazzled for having been thrust into such an odd situation.” She placed an incredible amount of time into this substitute position, held a part-time job in the evenings, and encountered several personal hurdles of her own throughout the school year. She was a 31-year-old woman with a husband and two young children (ages 2 and 3) who was adding on a large number of professional responsibilities to her already full schedule. Given all that was on her plate (as was true for all participants to varying degrees), I was very thankful for her willingness to participate in this study and her incredible accessibility throughout this work. Since I was primarily in Mrs. Kinsey’s classroom during this study, and her background and perspective greatly impacted the lessons and behaviors I observed, she is the participant who is being discussed in greatest detail in this chapter.

Support Received at P.D. James Middle School and Content Knowledge

As alluded to above, Mrs. Kinsey did not receive much support from colleagues and administration that aided in the difficult undertaking she experienced. Mrs. Frost, the other faculty member in her team, admitted that she and Mrs. Kinsey were unable to talk often about anything, whether it be students, curriculum, team rules, the school, or other concerns, because they taught the same periods and typically had different commitments immediately following the end of the school day (Mrs.F2_10.24.mp4, 23:50-26:55). Regardless, Mrs. Frost said she felt Mrs. Kinsey had supported the team expectations and done what the administration wanted her to do (Mrs.F2_10.24.mp4, 23:50-26:55).

Although neither Mrs. Frost nor the principal (nor any other member of the faculty and staff) observed Mrs. Kinsey's class the first marking quarter, Mrs. Frost believed other colleagues who taught the same disciplines as Mrs. Kinsey were meeting with her regularly. In actuality, these meetings rarely happened.

Mrs. Kinsey spent much of her time at the school getting acquainted with the curriculum, materials, and activities that were typically presented to students in the science and social studies courses. Although she had less pre-service background in social studies, she felt more supported by those colleagues who discussed lessons, materials, and assessments. Some of these colleagues shared a similar prep period with her and would come to her room to check-in on her comfort and preparation with upcoming content and activities; however, for science, her colleagues often provided her with materials the day of an activity, or possibly the day before, and rarely explained how activities and lessons were meant to unfold. Mrs. Kinsey expressed concern that she was not able to stay much ahead of the students in terms of the science curriculum. As a result, she expressed a belief that she delivered very similar lessons to the all-boy and all-girl classes and did not consciously tailor her lessons differently to each class,

I feel like if I knew the material a little bit in advance, or had a little bit more prep time where I was more comfortable with the material, then maybe I could motivate them [the boys and girls] differently...Because I feel like I get the materials the same day as the lesson, and I kinda feel like, "Just get it done."...I don't feel like I'm having enough time to think about, "How am I gonna present this to them?" (Mrs.K6_11.02.mp4, 36:54-37:59)

Therefore, constraints on her time led her to feel unable to adapt the lessons and activities to the possibly distinct needs or interests in the two classes. Although her unique situation of being a long-term substitute who had recently completed her pre-service program and was teaching this content for the first time makes this admission more understandable, a later chapter will explore how similar science lessons were between the two classes.

Although she had an endorsement in science, Mrs. Kinsey did not feel entirely confident with the content. According to her, science was the subject she had struggled with the most in school. But given her drive to succeed academically, she placed a lot of time and effort into her science classes and ultimately did very well in science such that she recalled the conversation between her and her counselor that led her to pursue an endorsement in science. She remembered the counselor saying,

“Look, your grades are practically straight A’s in science and you’re doing really well. Why don’t you want that as one of your endorsements?” And I just said I don’t know if it’s something that I felt that I could teach. Because of how much I struggled within it...[But I ultimately chose to pursue an endorsement in science] after talking to [the counselor] and her saying, “Well you’re not just pulling it off of the top of your head. You have resources.” Not knowing this, obviously, would be waiting for me [*pointing to the science classroom we were sitting in at P.D.*

James Middle School]. (Mrs.K1_09.27.mp4, 23:39-27:40)

As a result, Mrs. Kinsey ultimately received her endorsement in science and language arts, but her comments suggested that she believed she would need, or at least benefit from, having more resources available to her than those present at P.D. James Middle School. Regardless of these concerns and struggles, she persevered and put forth a lot of

effort into delivering lessons aimed to educate her students and have them keep pace with where Ms. Small tried to be in the curriculum at different points in the year.

Teaching Style

During her time at P.D. James Middle School, her first fall term as a teacher, Mrs. Kinsey furthered her own teacher identity while also trying to remain faithful to the policies and pace set forth by Ms. Small. She followed policies that Ms. Small endorsed, even though she personally supported some different ones (such as that she favored accepting late work and giving students some credit for it, whereas Ms. Small and Mrs. Frost did not give credit for work that was submitted after a certain due date), because she wanted the transition for students and adults to be as smooth as possible when, and if, Ms. Small returned (Mrs.K4_10.26.07.mp4, 31:35-34:20; Mrs.K5_10.30.07.mp4, 20:34-22:35). She admitted, “I feel the pressure of keeping pace, not because of necessarily what I’m doing, but because of the fact that if [Ms. Small] returns, or when she returns, if she returns, I don’t wanna be light years behind where she typically is. And it’s because it’s my first year of teaching” (Mrs.K5_10.30.07.mp4, 20:34-21:16).

As a new teacher, she claimed to still be figuring out her own teaching style. During the final week of the first marking quarter, Mrs. Kinsey reflected on her teaching style and explained, “I’m still learning as I go. I’ll be honest, it’s changed” (Mrs.K5_10.30.07.mp4, 19:18-20:34). Throughout the first marking quarter, she experimented with many different approaches to the classroom, assignments, and her teaching. She altered the classroom layout several times (e.g., students were seated in rows, then in differently arranged rows, and finally in pods) and sought various means to

motivate students. She acknowledged areas where she wanted to grow or try new approaches, and reflected on her own practices in an effort to enhance her teaching and the students' experiences (e.g., she said, "I don't like...the way I've been motivating them...They've all been negative motivation. And I kinda feel like, 'Let's do something to positively motivate them to want to learn this' and maybe some competition, table competition" (Mrs.K6_11.02.mp4, 1:07:10-1:08:15)). She tested different classroom management tactics, various ways to present information to students, and alternate means to start class and have students transition to the content she wished to introduce. Overall, her classes were primarily teacher directed and adhered to many of the lessons, assignments, and assessments that had been either used by Ms. Small in the past or pre-selected by other teachers involved with this content.

As for the rules and expectations she endorsed, she wanted students to be quiet when she was talking, believed students should remain focused on the activities being undertaken in the room, and disliked when students did not follow (often unstated) rules for proper on-task behavior. Although she wanted the students to be "well behaved," they did not consistently adhere to her wants, possibly because rules were not explicitly stated to them. As one of the students, Heather, explained, "We don't know [the rules in Mrs. Kinsey's class]. She never told us any rules" (10.24_SRT.mp4, 12:30-13:00). Regardless, Mrs. Kinsey was relatively lenient with the students and did not seem to instill the same fear, or possibly the same level of respect, that Ms. Small elicited or that was shown to the other teacher in their team, Mrs. Frost. As a result, the students were more rambunctious with Mrs. Kinsey than with Mrs. Frost, as evidenced by statements made by Mrs. Kinsey and the students. For example, one time when she grew frustrated with

the boys' behavior, Mrs. Kinsey told the students to place their heads on their desks and, initially alluding to a comment she must have just heard Tyronne voice, said:

Tyronne was 100% right when he said, "You know what? You would never behave like this down in Mrs. Frost's room." Never. One, she would never allow it. [*Student*: She'd be mad.] Two, I don't allow it but you seem to think I do... You've lost two minutes of break for tomorrow... And that break will be from here to Mrs. Frost if it has to be so that way, you know what? If you're late, you're gonna deal with her, not me. (Per12_Boys_back10.11.mp4, 45:56-46:32; Per12_Boys_front10.11.mp4, 45:09-45:45)

Tyronne's statement suggested an awareness that the students behaved differently in front of the two teachers. Similarly, Mrs. Kinsey acknowledged that they would not behave as poorly in front of Mrs. Frost. Although she stated that, like Mrs. Frost, she would not allow this behavior, she then penalized the students by taking away break time tomorrow and said that if they ended up being late from break they would have to deal with consequences from Mrs. Frost, not her. Such a statement seemed to further position Mrs. Frost as the main disciplinarian in the team for whom students would be more likely to behave and as though Mrs. Frost might somehow be less tolerant of student transgressions.

Although Mrs. Kinsey might be seen as offloading some of the disciplining onto Mrs. Frost in the vignette above, she regularly penalized students when she believed they behaved inappropriately. She would have them lose break time, place their heads on their desks, enter the hallway to line up and return to the room (ideally quietly), and receive detentions. These penalties were more often experienced by boys than girls and were

imposed much more often than in Mrs. Frost's class. Regardless, the students were much less inclined to behave well in Mrs. Kinsey's class and this could partially be due to the fact that some students might have viewed her as a substitute teacher, and therefore as someone who deserved less respect, or because she was simply seen as being less strict than Mrs. Frost.

She, like many of the students, defined herself as a teacher relative to Mrs. Frost. She explained that her style definitely differed from Mrs. Frost's in that,

I tend to be a little more relaxed, from what the kids tell me. I don't yell as much...I tend to give kids the benefit of the doubt and give 'em second and third chances. For better or for worse, I'm that type of person that, "Alright, I've talked to you. I'll let you slide this time. But if it happens again, we're done"

(Mrs.K5_10.30.07.mp4, 21:16-23:12)

She then admitted that she does sometimes allow students to "slide" multiple times and that, "I'll be the first to admit that sometimes it depends on the student, like how irritating what they've done is, or how many times I have to talk to that student"

(Mrs.K5_10.30.07.mp4, 23:12-23:25). She acknowledged her inconsistency and some of these actions might have also led students to be unsure of what they could do in her class and when their actions would lead to different penalties.

Students' Impressions of Mrs. Kinsey

Although there was some disagreement among students about their impressions of Mrs. Kinsey, such that one student in an interview said she was "kind, nice" while a peer disagreed and said he viewed her as "kind of grumpy all the time," there were some

general perspectives and characterizations that were voiced most frequently (10.26_SRT.mp4, 12:25-13:35). Most of these comments, which primarily arose when students were asked how they would describe Mrs. Kinsey to a new student who was joining their class, centered on Mrs. Kinsey's classroom management and whether or not she was "nice." Students who commented on her teaching expressed positive opinions, as evidenced by Susan who stated, "I think she is a really good resource giver" (10.03_SRT.mp4, 4:00-6:45) and Dana who said, "She's a really good teacher" (10.04_SRT.mp4, 15:30-16:45). As for her "niceness," many students explained that she was "nice" and less strict than Mrs. Frost. Mary summarized several views that were repeated when she said Mrs. Kinsey was "awesome, fun, cool" (10.03_SRT.mp4, 4:00-6:45).

The students saw her as less strict than Mrs. Frost and Jason acknowledged that students took advantage of Mrs. Kinsey, especially compared with how they behaved in front of Mrs. Frost for whom they were quieter (09.27_SRT.mp4, 2:15-4:05). Even students like Mitch, who said "Ms. Kinsey tends to give out detentions more than Ms. Frost" noted that students behaved worse in Mrs. Kinsey's class because she was not as strict and the students were "loud" and engaged in "throwing stuff and not focusing" in her class, whereas they would not behave that way in Mrs. Frost's class (10.05_Lunch.mp4, 9:15-12:40). Keith characterized his peers' behavior towards Mrs. Kinsey by saying, "We're rude to Ms. K. We don't pay attention a whole lot" (10.09_Lunch.mp4, 19:25-20:30). Similarly, girls claimed that they were able to get away with more behaviors in Mrs. Kinsey's class than in Mrs. Frost's class, such as passing notes (10.18_SRT.mp4, 16:20-17:00). Tameca also explained that students could talk and

socialize in Mrs. Kinsey's room, whereas students could not do that in Mrs. Frost's class (10.12_SRT.mp4, 4:15-6:10). Wesley agreed, saying that Mrs. Kinsey was, "Nice. Lets us talk" (10.12_SRT.mp4, 4:15-6:10) and explained that he would not socialize in Mrs. Frost's class because she would "kill him" (10.12_SR.mp4, 4:15-6:10).

Single-Gender Education

Mrs. Kinsey had no personal experiences with single-sex education and had not been trained in ways to lead all-boy or all-girl classes. In fact, near the start of the year she expressed surprise that the school had single-sex classes and said both she and her husband were unsure if such classes were legal in a public school (Mrs.K1_09.27.mp4, 29:05-34:15). She stated that her pre-service program had neither taught her, nor discussed, ways to teach boys and girls differently and she received no training in leading single-sex classes. When asked if Mrs. Frost or Principal Davis had supplied her with anything about this program or discussed what to expect or ways to teach these classes, she first replied "no" but then recalled that Mrs. Frost had given her an article to read about differences in how the boys behaved, relative to the girls (Mrs.K1_09.27.mp4, 40:45-41:50).

Her opinions of these classes changed throughout the year and it proved very interesting to see how her views were impacted by her experiences in this environment. In the first month of the year, she claimed that she would not send her sons to a single-sex school, unless they received a scholarship from the school for athletics or academics (or if the school could help them receive a scholarship to college), because she said they needed to learn how to interact with girls "because I think that socially, in the real world,

you need that to function” and that the “real world” requires them to interact with both men and women (Mrs.K1_09.27.mp4, 29:05-34:15); however, by the end of the first marking quarter she claimed “I’m not against it [single-gender education]...I’m indifferent” (Mrs.K6b_11.02.07.mp4, 32:43-35:45). Of all the adults at the school with whom I spoke, she was most willing to express concerns with the program and was neither firmly supportive nor resistant to it.

She expressed a belief that single-gender classes could be “risky” in that they might reinforce stereotypes and obscure the reality that several students might not fit these stereotypes. As a result, teachers might employ means to teach the boys and girls differently without exploring how to tailor their instruction to the specific needs and interests of the particular individuals within a given class, regardless of whether that class be single-gender or mixed (Mrs.K1_09.27.mp4, 1:27:40-1:31:04). In her view,

A teacher is supposed to differentiate their instruction based on the students they have, not based on gender. And that’s the issue I have with this [program]. If I’m differentiating my instruction based on what, how genders learn, and I forget about those one or two individuals, then that messes up the whole thing...[Y]ou can’t lose sight of that even though typically boys learn like this, and typically the girls learn like this, you’ve still got to understand that there’s going to be those three or four in there that might not typically learn like that...[Y]ou’ve got to be careful not to forget about those students just because you think you’ve already taken care of the problem by separating them out. (Mrs.K1_09.27.mp4, 1:27:40-1:31:04)

She was concerned that teachers might believe there is a perfect correlation between student sex and learning style, and therefore “differentiate their instruction based on what, how genders learn” instead of “differentiat[ing] their instruction based on the students they have” and these students’ particular approaches to learning, regardless of whether they be boys or girls. She cautioned that even if, “typically boys learn like this, and typically girls learn like this...there’s going to be those three or four [boys or girls in a class] that might not typically learn like that.” As a result, she was concerned that single-gender classes might lead teachers to be less sensitive and aware of the differences among the girls, or among the boys, and they could be more likely to treat all students within a given class uniformly, believing them to be the same simply because they were all girls or all boys.

Regardless of these comments suggesting her awareness and sensitivity to within-sex variability, Mrs. Kinsey still often spoke of the boys or girls as uniform groups and her views regarding single-sex education varied among different conversations. For example, although her comments above noted that, “there’s going to be those three or four [boys or girls in a class] that might not typically learn like [his/her same-gender peers],” she later claimed that teachers can use single-gender classes to get girls “excited about learning about science in a girls’ way” (Mrs. K6_11.02.mp4, 14:52-16:49). Therefore, she claimed both that not all girls learned the same *and* that there is a “girls’ way” to learn science. These seemingly contradictory perspectives, and others, which will be discussed in more detail in a future chapter, but might not be altogether unexpected. This seesawing between views might be more common, or more expected, among teachers who are newer to the profession but it has also been reported that people employ

two perspectives when discussing the sexes: (1) each sex could be conceived as a set of individuals who exhibit within-sex variability, and (2) each sex could be conceived as a group that exhibits characteristics that distinguish it from the other sex (Glasser, 2006).

Mrs. Frost: Language Arts and Mathematics Teacher

During the 2007-2008 school year, the district formally acknowledged Mrs. Frost's 25 years of teaching service in that district and she expressed to me a desire to retire in five more years (Mrs. Frost, personal communication, October 24, 2007). She taught elementary school for many years and ultimately switched to teaching middle school students in 1998 because she wanted to work with older students (Mrs.F1_10.01.mp4, 1:05-2:35). She and Ms. Small joined P.D. James Middle School the same year, and they had worked on the same team every year since then. They had not known each other before meeting at school, but Mrs. Frost said they got along well and their team was "a great success" (Mrs.F1_10.01.mp4 10:03-13:22). The two of them taught coeducational classes for two years, before asking the principal if they could switch to single-gender classes in the 2000-2001 school year.

While Ms. Small was responsible for teaching the students science and social studies, Mrs. Frost led the students in both language arts and mathematics. Although the majority of my classroom observations took place in the science classroom, I want to provide some information on Mrs. Frost and her courses since they may have impacted students' behaviors and perceptions of the single-gender team and events that transpired in the science classroom. Mrs. Frost explained that her language arts class often involved more "workshops" and group work than the math class, which contained more work done

individually (Mrs.F1_10.01.mp4, 55:52-57:03; Mrs.F2_10.24.mp4, 0:18-1:18). In language arts, the students were regularly engaged in reading and writing, often needing to revise previously submitted work. Different times in the year, students would get to select their own novel from a library she provided, or a book they suggested that she could approve for the assignment, and they would conference together about their readings and would provide feedback on each other's writings. As for mathematics, she claimed to make use of "lots of manipulatives" and tried to supply students with many visual aids (Mrs.F1_10.01.mp4, 53:05-53:51). Although she stated that a similar number of boys and girls have struggled in her math classes, she was aware that there was a "national" fear that girls were not doing well in mathematics and science (Mrs.F1_10.01.mp4, 51:42-53:05). As a result, she worked hard to counter girls' beliefs that they could not succeed in mathematics³⁷.

I really try very hard to make the girls feel that math is just really a fabulous study, that it's interesting stuff. Even though it's not true, I think most of my kids would tell you that math is my favorite thing in the world because I try to make them feel like that... Yeah, I think they would tell you it is. "Oh, Mrs. Frost all she likes is math." It's really not my favorite subject, never was. But I don't want the girls to ever feel like it's something they can't do. (Mrs.F1_10.01.mp4, 51:42-53:05)

Therefore, she placed much effort into conveying a personal interest and enjoyment in mathematics and wanted her students not to only learn the content, but to like the

³⁷ She never stated whether or not any of the female students she has taught had expressed this belief. In actuality, her specific female students might not have expressed that view, or might never have expressed it to her.

disciplines as well. Allowing them to choose their own readings in language arts was also done, in part, so students could pursue their own interests in the works they read.

Teaching Style and Students' Impressions

As noted in the above discussions of Principal Davis and Mrs. Kinsey, Mrs. Frost was a strong disciplinarian who was seen as having good classroom management skills. The students tended to be better behaved in her presence, compared with in Mrs. Kinsey's classes, and she exuded a no-nonsense persona and exhibited a strong confidence about her. In all the interactions with her in which I took part, or observed, she seemed to know what she wanted to have happen and rarely expressed doubt or wavered in her voiced thoughts. Some descriptions of her as a teacher, perceived by both Mrs. Kinsey and the students, were mentioned in the earlier discussion focusing on Mrs. Kinsey. The students often spoke about the teachers relative to each other, but Mrs. Frost was typically spoken of more often and was the reference point from where Mrs. Kinsey was described. These actions tended to center Mrs. Frost as the dominant personality between the two faculty members of the team, and this perception might have been enhanced by the fact that she was the only full-time member of the faculty who taught these students in their core courses this year.

Whereas Mrs. Kinsey was regularly described by her students as "nice," these same students often labeled Mrs. Frost as "mean." Even though the students admitted that, "Ms. Kinsey tended to give out detentions more than Ms. Frost," there was much agreement that they were better behaved in front of Mrs. Frost. (10.05_Lunch.mp4, 9:15-12:40). They explained that she was mean because she yelled, gave a lot of homework,

and, overall, seemed to intimidate them. Heather said, “she’s just always mad” (10.25_Lunch.mp4, 7:45-8:50), Marcus described her as someone who would “go psycho” whenever she got angry (10.24_Lunch.mp4, 18:15-20:00), and Susan described her as someone who was on, “crack times two because she gives us so much homework. It’s crazy” (10.03_SRT.mp4, 0:00-1:40). Marcus partially joked that, “By the way she screams, you’d think she was in the military” (10.26_Lunch.mp4, 16:45-18:25) and according to Heather, “no one likes Mrs. Frost” (10.24_SRT.mp4, 8:20-10:40),

Other students expressed dislike for Mrs. Frost and her class because, as Wesley stated, “she gets mad over nothing” (10.12_SRT.mp4, 10:30-12:05). Kristen had a similar comment when she explained that she was unsure why Mrs. Frost would “be all sweet and nice for a second and then she’ll start yelling at you” (10.24_SRT.mp4, 8:20-10:40). Stephanie said that Mrs. Frost, “kind of has that feeling that she’s kind of mean” (10.23_SRT.mp4, 18:10-19:50), but when asked if Mrs. Frost was truly mean, or if she was just perceived as mean, Stephanie replied, “it’s kind of both” (10.23_SRT.mp4, 18:10-19:50).

Related to this idea, some students acknowledged that Mrs. Frost might not truly be “mean,” and that they appreciated some of her behaviors. As Bill, Allen, Darnell, and Marcus explained, they sometimes liked when Mrs. Frost yelled because it kept their peers from being annoying for too long (10.26_Lunch.mp4, 16:45-18:25). Additionally, Kristen explained, “I don’t like her, like her, but I kind of like how strict she is on you to get you learning better” (10.24_SRT.mp4, 8:20-10:40). Therefore, although many students expressed dislike for Mrs. Frost and her classes, some saw her behaviors as having positive benefits for themselves and their peers.

The Single-Gender Classes

The single-gender program started in the 2000-2001 school year, after the principal agreed to allow one team of teachers, led by Mrs. Frost and Ms. Small, to try separating their students into all-boy and all-girl classes. These teachers believed such classes would lessen the amount of sex talk that took place in the classroom, which they felt was inappropriate for such young students and that these behaviors detracted from students' focus on academics. Additionally, Mrs. Frost and Ms. Small later became aware of information that highlighted brain differences between boys and girls, such that each sex could do better in school if distinct pedagogical approaches were used to best fit their unique male or female brain. Mrs. Frost clearly articulated her view that the all-boy and all-girl classes were, "doing exactly the same work...doing exactly the same lessons" (Mrs.F2_10.24.mp4, 30:00-31:25) and since the classes received the "identical curriculum" it was a "fair and equitable" program (Mrs.F1_10.01.mp4, 53:51-54:35). More discussion surrounding the reasons and history of these classes will be discussed in Chapter 4, which focuses on this topic.

Although Mrs. Frost recalled the prior principal, before Principal Davis, telling them, "Try it [single-gender classes] for a marking period kind of as an educational experiment and collect some kind of data to be able to talk to me about it at the end of the marking period and then we'll see what we want to do," she said they only generated anecdotal data and were allowed to continue teaching these classes after expressing their preference to the principal and he took the actions necessary for them to continue with

this program (Mrs.F1_10.01.mp4, 4:21-6:31). Since then, the single-gender team has been a part of the seventh-grade every subsequent year.

When the single-gender team was first started, it contained four teachers, one to teach each core subject. This team of four teachers remained together for two years, but scheduling and budget cuts led them to be broken apart (Mrs.F2_10.24.mp4, 44:40-46:05). Since Mrs. Frost and Ms. Small were certified to teach all four disciplines between themselves and they strongly supported the notion of single-gender classrooms, they remained together and continued to lead this unique team. One of the other teachers joined a separate coeducational team in the eighth grade and told me that she would be interested in teaching single-gender classes again. The fourth faculty member ultimately became a high school science teacher³⁸.

Because the single-gender team in this study had two teachers, whereas the other teams had four, these teachers taught approximately half as many students as teachers in the other teams. Additionally, since these teachers met with each of two groups of students (e.g., the all-boy or all-girl class) for approximately two periods each day, they opted to teach each discipline on alternating days, except on Friday when they taught all four subjects. For example, science was typically taught for two periods on Tuesdays and Thursdays as well as one period on Fridays. Mrs. Kinsey met with the all- boy class during periods 1 and 2 and with the all-girl class during periods 3 and 4 (see *Table 4*). Given when they met, the girls' class had lunch in the middle of one of their classes with Mrs. Kinsey.

³⁸ Coincidentally, this "fourth faculty member" recently pushed for and started teaching single-gender biology classrooms in the high school and I observed her single-gender classes and spoke with her and her students. Since they were not the focus of this study, nor did I receive permission to include them as participants in this work, I will not discuss them or these classes further.

Students Assigned to the Team

Principal Davis explained that students were randomly assigned to the single-gender team, “because we didn't want to stack the class” (Admin_10.01.mp4, 16:02-18:37). She said, “It would be tempting to try to put certain students into the class, but we didn't want to do that to try and alter the outcome of whatever we were going to perceive if we're doing a study” (Admin_10.01.mp4, 16:02-18:37). Although these classes had never been formally studied, she reasoned that randomly placing students into this team would allow them to better evaluate if the program itself was benefiting students; however, she stated that if she could “stack” the class, the students who she believed would benefit the most from the single-gender program would be, “youngsters who may have a need for a little boosting of their self-esteem or their skills, their social skills” (Admin_10.01.mp4, 18:52-21:20). She did not relate these benefits to academic outcomes. She did not explicitly state that students who were struggling academically, nor those who were behavioral concerns, should be the “certain students” whom she would be tempted to place into these classes. Instead, she would stack the team with students who were seen as behind in terms of their social skills. Similarly, when Mrs. Frost was asked what students she thought would benefit most from these classes, she said, “I think that some of the younger, the more immature kids. Socially immature. I think they probably benefit [the most]” (Mrs.F1_10.01.mp4, 28:55-30:43).

Additionally, Principal Davis said she did not want to handpick specific students to place into this team because the team might develop a negative image by containing the students who were socially “behind.” She said,

I would really hate to create a situation where it's a program that people might have some sort of negative perception of and not want their child to participate...The unfortunate thing is then those students who would help provide balance to the program, being positive role models then maybe some of them would opt out. And that's the last thing I would do. I think I would do it in a matter that's similar to what I've done to other programs. Let's say, for instance, I have English as a Second Language that I've included on a team and also Special Education inclusion classes that are co-taught on certain teams and I'm very careful about making sure that we don't exceed a certain number and my goal is not to exceed a third in any class. You know, more like twenty-five percent to a third in any class of a particular population that could skew whatever the dynamic is in the classrooms so I would want to do something similar with the single-gender group. (Admin_10.01.mp4, 18:52-21:20)

Principal Davis' statement that she would not want the single-gender team to develop a "negative perception" such that "positive role models" would opt out of participating in the team, suggests that the students who need a boosting of their social skills, namely the students whom she would "stack" into the single-gender team if she could, were not positive role models and carried a negative stigma. Additionally, her goal of limiting each "particular population" in a class to no more than "twenty-five percent to a third" might be difficult in this school given that more than 85% of the student body was White and the goal seems contradictory to the goal in a single-gender class where 100% of the students are of the same sex.

Regardless, since she did not want only a specific subset of students to be placed into this team, she explained

So we said we'll let the computer randomly select the students [to be placed into the team] and once the students arrive we explain to them how the program is going to run. We always offered the option for parents or students who did not want to be a part of the program to move out of the single-gender program, but I say, for the most part, we have had very few parents who have opted to not have their youngsters in the program (Admin_10.01.mp4, 16:02-18:37)

As suggested by her comments, the students and families first learned that they would be part of a single-gender team after they arrived to school at the start of the year. Mrs. Frost even pointed out to me that many parents “had no idea” their children were in a single-gender team during “Curriculum Night,” which took place during the third week of the school year, mainly because “the kids don’t go home and say anything about it” (Mrs.F1_10.01.mp4, 36:00-37:50). It seemed that word-of-mouth was the main means for this information to reach families³⁹.

Although Principal Davis said the students were randomly placed into the single-gender team, she later clarified that certain students could not be part of that team due to scheduling issues that would arise. Specifically, students who were enrolled in “advanced mathematics,” labeled as having “special needs,” or known as English as a Second Language (ESL) students, could not be part of the single-gender team. Since she had “limited resources,” she placed male and female ESL students in a class together and

³⁹ According to Jocelyn Samuels, Vice President of National Women’s Law Center, this arrangement was illegal and the entire school’s single-gender program could be challenged as a result (personal communication, April 9, 2008). However, Samuels did not clarify whether she believed the arrangement

male and female students with special needs together, so that she would not need to pay for two ESL aides or two special education teachers – one for the all-boy class and one for the all-girl class (Admin_10.01.mp4, 22:36-24:38). As for the advanced mathematics students, they were not in this team because it contained two teachers while the other teams had four teachers. This team structure led them to follow a different schedule from the coeducational teams (e.g., they taught disciplines on alternating days (except Friday) and often for two consecutive class periods, while the coeducational classes taught each discipline every day). This difference in scheduling was supported by the teachers and principal, even though it meant that no advanced mathematics students would be placed in the single-gender team.

As a result, Principal Davis said the single-gender team contained, “the middle fifty percent, so to speak. We don't have the special needs students, we don't have the ESL students, and on one end of the spectrum we also do not have the advanced math students which would be on the higher end of the spectrum, so we pretty much get the average student in the group” (Admin_10.01.mp4, 22:36-24:38). These comments suggest a belief that she saw the single-gender team as containing a sampling of students who were neither the extremely high, nor extremely low, academically performing students in the school; however, how many of these “randomly selected” students ultimately remained in the team?

When asked if any students opted not to be in the single-gender team, Principal Davis replied, “they may say, ‘Oh I don't know if I want to be a part of that.’ And then we let the teachers have a conversation with them and, for the most part, once they find

could be challenged because the parents' did not know about this arrangement beforehand or because families did not voluntarily elect to have their child(ren) placed into this team.

out that it's not something that they should worry about it or that their friends are going to tease them then most of them relax and they decide to stay” (Admin_10.01.mp4, 16:02-18:37). Mrs. Frost told me, “We haven't had one child removed from this team...We've never had one family say, ‘I want my kid in a mixed group’...Several times we've had kids say, ‘I don't like this.’ But they’ve never asked to leave. We've never had parents remove anybody” (Mrs.F1_10.01.mp4, 36:00-37:50). Therefore, it seemed that the school placed an assortment of students into the single-gender team (except for certain students who could not be part of the team) and none of the students had ever been removed from the team because of a student or parental concern with the single-gender program.

A Second Single-Gender Team at the School

While I was at P.D. James Middle School, Principal Davis and Mrs. Frost briefly mentioned the fact that one team of eighth grade teachers tried single-gender classes the previous year, 2006-2007. Principal Davis said those teachers found it to be more challenging than expected and they returned to teaching coeducational classes in the 2007-2008 school year. But she also said she would prefer not to explain their experiences. Mrs. Frost did not go into much detail about that situation either and suggested that certification issues might have contributed to the team reverting back to a coeducational environment this year⁴⁰. The details of this team and their experiences were murky and I could not obtain much more information while respecting Principal Davis’ wish of not wanting to discuss it (and not having those teachers included in this study). Although the experiences of this single-gender team could prove very interesting,

⁴⁰ She did not thoroughly explain this connection between certification issues and single-gender classes.

my inability to generate more data concerning it has led me not focus much writing or analyses on it (Admin_11.01.mp4, 41:15-46:41; Mrs.F1_10.01.mp4, 18:31-23:12).

Individuals within the All-Boy and All-Girl Classes During this Study

In this study, the girls' class started the year with 30 students, 3 (10.0%) of whom were students of color, and the boys' class started with 32 students, 6 (18.8%) of whom were students of color. According to the Principal's records, all three female students of color were Black, while four boys were Black, one was Hispanic, and one was Asian/Pacific Islander. The remainder of the students were identified as White, much like the school as a whole⁴¹.

Before the end of the first marking quarter, two girls from this class left the school. Later in the year, two other girls joined this team, returning the class size to 30 students. In the final marking quarter, one boy left the school as did another girl (but she remained long enough to receive a grade that quarter). Overall, approximately 20% of the original 62 students in this single-gender team qualified for free, or reduced fee, lunch, which is roughly comparable to the student body as a whole of which 23.4% qualified for free, or reduced fee, lunch. All 30 (100%) of the girls who started the year in the single-gender team, and 28 (87.5%) of the 32 boys, agreed to participate in this study.

When discussing the single-gender classes, and the students within them, I am cautious about providing broad descriptions that might characterize the classes as homogenous entities. There was great diversity in the classes, as both the all-girl and all-

⁴¹ Comparing these figures to *Table 1* the team had approximately the same percent of White students as the school as a whole (85.5% of the students on the team were White while 87.9% of the student body as a whole was White). Comparable analyses using that same table could be performed to see how well each single-gender class, or the team as a whole, represented the racial makeup of the school as a whole.

boy classes contained students with varied interests, temperaments, and personalities. They had students who performed well in school and others who struggled. Students of various racial and socioeconomic backgrounds were in the two classes and each individual developed different relationships with her/his peers and teachers. In future chapters of this work, more specifics about individual students (and adults) will be presented as they are discussed in greater detail. Nevertheless, it can be important to note some differences I observed. These descriptions might not highlight behaviors in which all students in the class engaged, but can suggest some of the gendered norms that existed or were supported in each space.

For example, within my first week at the school, I noticed a difference in the clothes and school supplies that were seen in the two classes. In addition to the fact that only girls wore certain items (e.g., dresses), many girls wore clothes and had book bags or other school supplies that looked newer and contained pastels and bright colors, whereas many boys tended to wear more muted colors and their clothes and materials often seemed more tattered or worn. Many girls tended to have longer hair and partook in much more note passing, whereas the boy class had more items airborne (typically paper footballs or mini-skateboards). Students in both classes seemed to enjoy drawing and many of them would doodle during class or before a lesson had formally begun; however, the content of their drawings differed significantly. It appeared to me that the girls more often drew people, many times with their figures' statements or thoughts portrayed through word or thought bubbles. Additionally, the girls seemed more likely to construct scenes that incorporated colors. As for the boys, they more regularly drew scenes that involved weapons and violence, many times taking particular care to emphasize or

embellish exquisite mechanical devices and contraptions that appeared in their drawings⁴².

Me, The Researcher

As discussed in previous chapters, I was an important participant in this study who affected the data that was generated and the interpretations that are ultimately being presented. Chapter 1 discussed aspects of my background and perspectives that related to single-sex education while Chapter 2 explained how my location in the room impacted the data that was generated. In this chapter, I will explain more about my behaviors and identity in this research setting in order for readers to better understand me as a participant in this study.

Interactions and Relationships with Other Participants

Although I did not sit beside students during many lessons, I interacted with them regularly and informally during, and outside of, class. The students seemed comfortable with me and several boys and girls asked me to have lunch with them and come to their after-school activities. I made a point to attend a boys' football game, a girls' basketball game, and eat lunch with them in the cafeteria on a number of occasions. Additionally, they felt comfortable breaking school and class rules in front of me and clearly became less concerned about me as a potential disciplinarian after they noticed that I would not "tattle" and get them in trouble. As a result, they began showing me the drawings they

⁴² Although I neither collected nor saw all the artwork produced by the students, boys and girls showed and supplied me with many of the items they created. As noted above, these descriptions might not describe how all boys or all girls behaved, but it explains the personal impressions I noted as I was introduced to their work during my time at the school.

made during class, notes they had written or received, or toys they played with when the teacher was not looking. They spoke with me socially about their relationships, hobbies, and other items they wished to discuss. Similarly, throughout my time at the school, the adults seemed to grow more comfortable with me and would talk about other faculty members, administrators, parents, and students in frank ways, occasionally even harshly criticizing others or telling me politically incorrect statements and jokes.

Although the teachers and principal might have felt a desire to positively portray the single-gender team, Mrs. Kinsey seemed very willing to discuss her uncertainty and concerns with the program. Similarly, these participants might have been concerned that I might be evaluating them. Fortunately, Mrs. Kinsey directly addressed this issue and noted that she was initially worried that I might evaluate her. As a relatively new teacher who was still seeking full-time employment, she explained to me that she wanted good evaluations from many people at the school; however, she acknowledged that her fear that I might be evaluating her subsided as she and I spoke more and she gained a better understanding of me and the focus of my work.

But as a new teacher who was introducing this content for the first time, she often had many questions about her lessons, students' behaviors, and the various activities and worksheets that were employed in these courses. My experiences as an undergraduate science major, high school science teacher, and pre-service teacher educator, partially led Mrs. Kinsey to come to me a number of times with questions or for advice. Although I wished not to be too involved in the decisions that were implemented in the classes, I spoke with her regularly about her courses and teaching and was willing to assist when I felt comfortable. For example, I suggested that she introduce "warm up" questions to

help students transition into the lesson. Additionally, I occasionally walked around the room and asked students questions about the science content involved in the experiments they were doing or the worksheets they were completing. I was very appreciative of Mrs. Kinsey's willingness to allow me into the classroom and her openness in talking with me as part of this project, and I wanted to support her where I could. Given that she sometimes asked me questions or spoke with me during a lesson or activity, I was concerned that students might not be willing to say negative views about Mrs. Kinsey in the interviews. Such concerns proved unfounded.

My Identity Labels

During this study, I was often labeled as being, and typically self-identified as, a late twenty-something, White, heterosexual male graduate student who was socioeconomically part of the middle class. These identity labels, or identifiers, influenced who I was, how I behaved, and how I was perceived and treated by other participants. Other characteristic identifiers also impacted me and this work (e.g., students guessed what sports they believed I played at Michigan State University, where I pursued this doctorate, even after I admitted that, in truth, I was not an athlete in the Big Ten Conference), but I am focusing on the several identifiers I first mentioned because they seemed to have the greatest noticeable impact and can provide insight into how other identifiers could have also affected the study and the results that have been generated.

Given my age and personal opinions regarding appropriate dress in this setting, I often came to school dressed in casual or professional attire (typically a button-down shirt with slacks) and was addressed as "Mr. Glasser" in front of students. As a result, the

students might have seen me as being more like their teachers than like them; however, they also knew me as a current student who was still in school like them. They were interested in guessing my age, knowing how many years I had been in school, and hearing what it was like to attend Michigan State University. They seemed eager to connect with me about the athletic program at the institution and would talk about wanting to one day attend the same school or the “rival” school, University of Michigan. I also had the impression that more boys than girls, especially near the beginning of the study, were excited about interacting with me and getting my approval. Perhaps this perception resided solely in my head, but it might also have arisen because I was one of the few adult males in the school. Over time, the girls seemed to start making more attempts to connect with me or impress me and would seek to have me join them at lunch or attend their after school activities.

Being a male researcher, especially one who focused on elements related to single-sex education, the participants might have been more or less likely to make certain comments. I was concerned that the students, teachers, and principal could be less comfortable voicing negative perceptions about the boys or they might believe I would not be as sensitive to girls’ needs and experiences. Similarly, the boys might have had an easier time opening up to me during the interviews whereas some girls could have felt awkward talking with a male researcher about gender issues, such as what would be the best or worst things about having students of the “opposite” sex in their classes. Fortunately, I do not believe many of these potential issues impacted the generated data to a large degree. Participants seemed comfortable voicing negative views about boys (sometimes being mindful to explicitly state that they were excluding me from their claim

or generalization) and I made it clear that I was interested in the girls and boys equally. As a result, none of the participants made me feel as though they thought I was at the school with a particular agenda or interest in boys' issues more than girls' issues.

While at the school, the students who seemed most distant and least eager to talk or connect with me were the female students of color. Although their interactions were neither cold nor hostile, I just never felt like I established a great connection with any of these students. Many reasons could have contributed to this result, and my being a White male might have impacted this outcome. Related to this topic, my "natural" discourse in this setting seemed to align more with what was spoken by many of the White students, and I also noticed that I had more personal interests in common with the White students than the students of color (e.g., music that we enjoyed). Also, some adults seemed to be less politically correct in their language than they might have been if I were a person of color. One teacher referred to "colored students" on more than one occasion; however, I am not sure if she was aware that that many people today view that phrase as insensitive. Regardless, such observations lead me to wonder how and if similar studies would be affected by the race, and other identifiers, of the specific researcher(s) involved.

Additionally, although the teachers might have surmised I was unmarried by the absence of a ring on my finger, they made many heteronormative comments about students that I do not think they would have made if they had not perceived me, consciously or unconsciously, as heterosexual. For example, when discussing Mrs. Frost's comment that there was too much sexual talk taking place in coeducation classrooms, Mrs. Kinsey casually commented that she had indeed noticed more flirtation in her coed elective class than in her single-sex class before quickly stopping herself,

mid-sentence, laughing and, seemingly embarrassed, saying she “obviously” hoped there was no flirting taking place in the single-sex classroom (Mrs.K1_09.27.mp4, 43:50-45:25). Additionally, the students regularly used the term “gay,” and much more rarely “lesbian,” negatively towards other people, assignments, or objects (e.g., a particular novel they were reading), and I have a feeling that some of these comments by the adults and students might have been lessened in my presence if I were seen as a non-heterosexual individual, or a heterosexual person who did not tolerate or want to hear that language. I consciously chose not to voice my perspective on the language and comments voiced by other participants and wanted to see what they would more “naturally” say and do without me consciously passing judgment, in the moment, about their behaviors.

Conclusion

The above sections provide detailed information about participants in this study and allow readers to gain more insight into individuals who will be discussed further in the coming chapters. Readers are encouraged to seek similarities between the participants in this study and people outside of this work. It can be tempting to attribute results and claims, especially in studies that focus on one setting, to particular attributes of the specific participants involved in the study. Although I consciously sought localized knowledge for this site, the rich descriptions that are being developed enable readers and me to engage in “case-to-case” generalizing, as discussed in Chapter 2. Although the following chapters will discuss the perspectives for the single-gender classes at P.D. James Middle School, the culture of single-sex education that developed in this team, and what it meant to be a boy or girl in this setting, the outcomes discussed need not be

entirely unique to this site as elements of the school and people – including their backgrounds, views, and behaviors – might be similar to those of many other schools and people.

CHAPTER 4: PERSPECTIVES FOR THESE SINGLE-GENDER CLASSES

As noted in Chapter 1, there are several reasons why people might push for single-sex classrooms or schools. To assess the effectiveness of a program, and gain more insight into the particular community and individuals involved in a specific single-sex setting, it is important to understand the perspectives voiced regarding why such classes were originally created and continue to exist in a given school. Participants' perspectives included the reasons they said these classes existed along with related comments they made regarding differences between seventh-grade boys and girls. At P.D. James Middle School, there is no written policy concerning the history, rationale, or objectives for these classes, and I ultimately relied on comments from Principal Davis, Mrs. Frost, Mrs. Kinsey, and students in these classes to piece together an understanding of why these classes were started at the school and exist today.

Principal Davis and Mrs. Kinsey said Mrs. Frost would best be able to explain the original rationale for the creation of the single-gender team, since she was one of the teachers who helped initiate this team. Also, both Principal Davis and Mrs. Kinsey first started working at the school after this single-gender team had been created. As for the students, they attributed the reasons they provided to comments made by Mrs. Frost. As a result, this chapter primarily focuses on the reasons voiced by Mrs. Frost. I will introduce the rationale provided by Principal Davis and Mrs. Kinsey before transitioning to Mrs. Frost's comments. After discussing these adults' explanations, I will focus on students' accounts of explanations that were supplied to them and their responses to some of the reasons they were given. The chapter will conclude with a discussion summarizing

participants' reasons for these classes and purported differences between girls and boys that were mentioned during these conversations. In this conclusion, the reasons will be categorized as (1) financial, (2) socio-emotional, and (3) academic, while differences will be grouped according to (1) cognitive, (2) behavioral, and (3) physical. These stated reasons and differences can suggest distinct ways girls and boys were viewed in this setting.

Principal Davis

No Reasons in Informational Materials Provided by the School and District

When I initially sought to learn about the history and reasons for the single-gender team at P.D. James Middle School, I believed I would be able to review papers that explain these classes to students, parents, the media, or the public; however, Principal Davis did not supply me with any materials the school or the district currently makes available, or has distributed in the past, about the single-gender classrooms. When seeking this material, I provided suggestions of things that could be helpful, including letters sent home to parents and boilerplate language used for press inquiries. But none of these items was said to exist. Additionally, she was unable to supply me with any materials that explained to parents and the public the rationale, origin, and policies and procedures governing the classrooms, such as how students are assigned to, or able to be removed from, this team. This result is consistent with statements made by Principal Davis and Mrs. Frost, suggesting that few parents knew before the start of the school year that their child(ren) were assigned to a single-gender team⁴³.

⁴³ See the section titled, "Students Assigned to the Team" in Chapter 3 for more discussion surrounding this topic.

I was surprised that there was no pre-prepared, and easily accessible (e.g., on the website for the school or district), information about this team because I assumed such information would exist for parents or other individuals and organizations who inquire into this policy, especially in terms of its potential benefits, educational, social, or otherwise, and its legal basis. Although no hard copy materials were supplied, Principal Davis provided details on many of these topics during our conversations. Her ideas were especially important because as the head of the school her comments could be those that get presented to concerned parents, members of the school board, and others regarding these classes.

Reason: Retaining and Attracting Families to the School

Principal Davis supported this single-gender team and expressed a desire to expand the program to other teams and grades in the future (Admin_10.01.mp4, 24:38-26:04). She wanted the single-gender team(s) to continue indefinitely and said that if the teachers who initiated the program were to retire before the program had expanded,

Then what we would do is try to train some other teachers so that they would be able to step in so that the program could continue...because I think it's become a part of the building. People think of [P.D. James Middle School] and they think of it as the school that has this special offerings and I would like for that to remain a part of the identity of the building and hopefully one day it will be something that will attract parents to the district and to the school if it's something that's available for their child and something that they want and we're in a climate where we're competing for students it'd be lovely if we had a program that we could probably

offer six through eight so that parents who may be contemplating going to private schools or even moving their child to another school district, they may choose to stay because of what we have to offer here. (Admin_10.01.mp4, 24:38-26:04)

These views provide a reason why she, and the district, might support this program at P.D. James Middle School. By supplying parents with the opportunity to have their children educated in a single-sex environment, some parents might be less likely to leave the district and opt to enroll their students in a private school or competing school district.

Although private schools and charter schools can impact a school's enrollment and subsequent funding, Principal Davis' belief that the single-gender offering might be attractive to parents seems to contradict implicit messages communicated by having no well-publicized and easily accessible information about this team for the public and parents. Such materials might be more likely to exist if the school sought to make more people aware of this offering. These materials could be created in the future, or perhaps there is a reason they have chosen not to publicize about the program at present.

Interestingly, this reason for offering, and even expanding, the single-sex option was not rooted in any stated educational or social benefit for the children. What did Principal Davis say regarding the benefits of such educational offerings?

Reason: Increase Girls' Confidence, Assertiveness, and Performance in Math Class

Although Principal Davis explained that no data had been collected on the single-gender team at the school, she used anecdotal evidence and her own impressions to conclude that it is "a wonderful program" and she encouraged other schools to "take that step forward and try it. I think it would be worthwhile for their staff and the students"

(Admin_10.01.mp4, 35:20-36:09). She explained her belief that it has been a positive program, in part, because the teachers have found leading single-gender classes to be an “enjoyable experience” and the students in this team “enjoy it” too (Admin_10.01.mp4, 3:43-6:23). Additionally, she reported that the program has been of great benefit to the students.

According to her, this single-gender team was originally created several years before she became principal and:

It really was a program that was supported by the previous principal. It was really a teacher initiative...I think the initial concern was trying to attend to the young ladies who may have had some difficulty in math and who may not have fared as well in the math class. But they also were seeing some issues with how girls, in general, would not speak up or be as assertive in the classroom when they were in the mixed gender classes so they said it’s worth a try. (Admin_10.01.mp4, 3:43-6:23)

According to these comments, a major impetus for separating the sexes stemmed from concerns regarding the girls and aimed to bring about positive changes for them. In addition to enabling teachers and students to increase girls’ performance in mathematics, the classes led to an increase in girls’ confidence. “We see an increase in confidence in the young ladies for sure, in single-gender” (Admin_10.01.mp4, 13:43-15:15) and she touted that outcome as a major benefit of these classes.

Regardless, her conclusion that the girls’ self-confidence increased as a result of the single-gender class suggests that one “solution” to this “problem” was removing the boys from the girls. As a result, the boys were implicitly labeled as the problem and a

simple fix involved taking these problem students out of the classroom. There is no indication that any additional actions were taken to alter the boys' or girls' behaviors and confidence. Such a "solution" might only temporarily rectify a symptom of the problem, and not the problem itself. When the girls and boys return to mixed settings, the same outcome as before might continue to arise.

Mrs. Kinsey

As the long-term substitute who was asked to fill-in for Ms. Small, Mrs. Kinsey sought to adhere to the expectations established for the team and wanted there to be a smooth transition when Ms. Small returned to the classroom. Mrs. Frost told her reasons why both she and Ms. Small sought to separate the boys and girls. According to Mrs. Kinsey, these classes were created because

[Mrs. Frost] felt that the boys were very crude talking and that it was stuff that girls didn't need to be hearing. That the boys were less socially mature at this age level than the girls so separating them seemed to increase [both boys' and girls'] learning capabilities...because the girls weren't socially, y'know, thinking about "boys, boys, boys" all the time. And they were more comfortable in their surrounding...And that the boys weren't offending. They weren't being stimulated by the girls...[The boys] were able to have their space and be more comfortable in their surroundings...And [Mrs. Frost and Ms. Small] were able to teach them [the boys and girls] differently...She said something about the boys need their space because they get a shot of testosterone. You'll have to ask her...If [the boys] were able to move and let off some of that testosterone that

they were getting, that they would be able to be more focused.

(Mrs.K1_09.27.mp4, 41:50-43:50)

These ideas echoed ones Mrs. Frost supplied to me when she was asked about this team. Given that Mrs. Kinsey repeatedly suggested that I talk with Mrs. Frost for more details, and that Mrs. Frost ultimately provided more information about her and Ms. Small's thinking regarding these classes, more space and discussion will be devoted to these reasons in the section below, which focuses on Mrs. Frost.

In this section that focuses on Mrs. Kinsey, I want to note the general ideas that she seemed to have picked up from her conversation with Mrs. Frost. The ideas Mrs. Kinsey voiced tended to position the girls as more mature students who should be protected from boys' crude, sexual behaviors. All boys and girls were presumed to be heterosexual, whether indicated by girls' focus on "boys, boys, boys" or the boys being stimulated by the mere presence of girls. Additionally, there seemed to be some desire to teach boys and girls "differently" and separating the boys and girls was claimed to increase students' comfort in class and their learning.

So exactly why did Mrs. Frost initially desire single-gender classes? And why did she believe a single-gender team should continue to be supported at the school?

Mrs. Frost

Unlike Principal Davis and Mrs. Kinsey, Mrs. Frost had been at P.D. James Middle School since the single-gender program started in the 2000-2001 school year. In fact, she and Ms. Small initiated the program. As Principal Davis explained, the creation of the single-gender team was "a teacher initiative," which began before her tenure as

principal (Admin_10.01.mp4, 3:43-6:23). Given Mrs. Frost's significant role in the creation of this team and its present form today, she was positioned by Principal Davis, Mrs. Kinsey, and the students as an authority on the single-gender team. According to Mrs. Frost, the single-gender classes exist because:

1. Sex reasons: There was too much sex talk in coed classrooms
2. Brain reasons: Boys and girls are different

These categories represent the two main ideas that were voiced by Mrs. Frost and they had been communicated to Mrs. Kinsey and the students, as evidenced by their ability to repeat many of the statements that she had told them. As a result, there was sizable overlap among the reasons supplied by Mrs. Kinsey, the students, and Mrs. Frost. Since these ideas were all attributed to Mrs. Frost, I will focus on them in this section.

Sex Reasons: There was Too Much Sex Talk in Coed Classrooms

The Concerns

Mrs. Frost and Ms. Small began teaching on the same team at P.D. James Middle School in the fall of 1998. At the time, Ms. Small was just beginning her teaching career while Mrs. Frost was beginning her middle school teaching career after having taught elementary school for many years. She switched to the middle school because she wanted to work with older students and, as she said, "As my two kids got older I was less patient with tying shoes and wiping runny noses" (Mrs.F1_10.01.mp4, 1:05-2:35). That same fall, her daughter started college and her son started high school. Their matriculation through school affected her thinking about what grade levels she sought to teach, and their experiences in single-sex institutions impacted her thoughts regarding the benefits

of separating the sexes in school. This connection will be clarified after introducing concerns she and Ms. Small had with the coeducational classes at P.D. James Middle School.

According to her, soon after starting her position in the middle school, both she and Ms. Small were “stunned” by some of the behaviors they saw students exhibit. She explained,

We started talking about how shocked we were by the conversations we heard these kids having. And it wasn't just that they were swearing or that the language was kind of foul. It was the things they were doing were just shocking to me, shocking to her...It was highly charged sexual kind of talk we were hearing. Now whether or not they were blowing it all out of proportion and it was just talk is something I'll never know. But it was shocking to me. That they were talking about having sex with people and who was doing who. They were 12-year-old girls...[M]ostly the girls were talking about it a lot...There was just so much sexual tension in the school...The girls were all competing for the boys. They weren't being friends to each other. They were constantly competing. "Who's going with who" and "Stay away from my boyfriend" and all of that sort of silly stuff was interfering with what they were supposed to be doing which was learning math and science and social studies and language arts. The boys were all kind of confused by it. They were just kind of swept into the whole wave of the whole thing. But again, many of them were just young, weren't ready for that sort of thing... I'm not even sure that they [the girls] know that they're ready for sexual contact. I don't think it's that that they're aware of [that], but they know that

they're ready for something physical, some kind of physical connection. And so they reach out. The boys respond to that the way they would respond to that. They think it's a physical approach, it's a sexual approach...The kids aren't learning to be social. They're learning to be sexual. (Mrs.F1_10.01.mp4, 10:03-15:57)

Mrs. Frost was clearly unnerved by the behaviors she witnessed and felt they were inappropriate for two reasons. One was that these actions “interfered” with what students were supposed to be doing in school. She explained that the sex talk, posturing, and competing led students to be less focused on their academics. The second concern, which was the reason she invoked most regularly, was simply that many students “weren’t ready for that sort of thing,” namely sexual relationships and behaviors. To her, “there’s plenty of time for learning how to do that stuff later on...outside of school and when you get to high school” (Mrs.F1_10.01.mp4, 27:46-28:55). She believed seventh graders should not be engaging in these behaviors in school and such actions should be absent from middle school classrooms.

Although she earlier commented that she did not know if the students “were blowing it all out of proportion and it was just talk,” she and Ms. Small found these behaviors in school, even if it was “just talk,” to be wholly inappropriate and, “We decided we had to do something. And that’s when I said, ‘Gosh I’m so glad I sent my daughter to [a single-sex private school], so she didn’t have to deal with this.’” (Mrs.F1_10.01.mp4, 10:03-13:22).

Her Daughter's Experience

According to Mrs. Frost, these sexual and romantic discussions and behaviors were absent in her daughter's single-sex school and she therefore thought they would be absent or lessened if the sexes were separated at P.D. James Middle School⁴⁴. It was important to her that these behaviors be absent from her daughter's school because her daughter had initially been nervous about attending high school, "cause she was one of those young, young girls" (Mrs.F1_10.01.mp4, 10:03-13:22) who went to kindergarten at age 4 and graduated high school at 17. Mrs. Frost said that around the start of high school, many of daughter's classmates were beginning to become more interested in boys than her daughter was. These girls were more focused on getting a boyfriend than on academics or on maintaining and developing friendships with girls (Mrs.F1_10.01.mp4, 26:07-27:46). Family members suggested that she consider single-sex private schools. Her daughter visited several such schools and ultimately settled on one where, according to Mrs. Frost, her daughter "loved it, felt very protected there...She was just very young and she wasn't ready for the dating scene and some of these other girls were. And at [the single-sex private school] that was downplayed so academics were the big thing. She fit right into that, felt comfortable" (Mrs.F1_10.01.mp4, 6:31-8:53). Because of her daughter's positive experience, her son looked into a single-sex high school, which he ultimately attended and enjoyed as well. Mrs. Frost claimed that these experiences were

⁴⁴ Although Mrs. Frost did not explain how she knew these behaviors were absent at her daughter's single-sex school, she seemed to presume that this outcome was attributed solely to the single-sex nature of the classes and that a similar outcome (i.e., at least a lessening of sexual and romantic discussions and behaviors) would arise for her team at P.D. James Middle School if the boys and girls were separated. She did not acknowledge that there might be other reasons that contributed to this outcome at the private school that might not exist at P.D. James Middle School, such as the professional development received by the teachers concerning sex talk/behaviors among adolescents or the makeup and demographics of the student body that attended these schools. Additionally, even if these behaviors were minimized at her daughter's

fabulous for both of them and influenced her thinking about how to “do something” about the amount of sex talk and behaviors she and Ms. Small saw at the middle school.

Doing Something: Implementing Single-Gender Classes

They began reading about single-sex education and asked their principal if they could give it a try in their team. She provided him with the readings they had completed at the time, which consisted of some articles they had found on the Internet and in a magazine. They received permission to try single-gender classes for one marking period as an “educational experiment” and they would be expected to “collect some kind of data” in order to talk with him at the end of the term; however, it took them less than the marking period to realize they preferred the single-gender classes and wanted to continue teaching them (Mrs.F1_10.01.mp4, 4:21-6:31). She said no data was collected, but the principal let them continue teaching these classes the remainder of the school year and said he spoke with whomever he needed to in order to get permission for them to continue teaching them the following year.

Mrs. Frost felt that these classes successfully lessened the amount of sexual tension and behaviors in the classroom, which enabled the students to remain children longer. As she explained, “We’re still learning about how to accommodate them [in single-gender classrooms], but I think our focus was initially just to let them be 12-year-old kids and to allow them to not feel that pressure to be too grown up too early and I think that we’ve accomplished that. We’ve had many parents come and say, ‘Oh I’m so glad that my daughter was, you know, not in with some other kids that would push her

single-sex *school*, she did not explain why the same result would be likely to occur if a single-sex *team* was constructed within her coed, public middle school.

into a situation she just wasn't ready for'" (Mrs.F1_10.01.mp4, 30:43-33:42). And who are these "other kids" who are no longer in classrooms with these girls? These "other kids" are boys.

Protect Girls' (Hetero)sexual Innocence

The not-so-subtle subtext is that boys are the ones who would push these girls into "situations" (e.g., sexual behaviors) that Mrs. Frost and these parents did not believe the girls were ready for. This theme of separating the sexes in order to protect girls' sexual innocence from boys' physical advances was reinforced through multiple comments Mrs. Frost made. As seen in her earlier comments, she stated that it was mainly girls who were focused on "who's going with who" and were ready for "some kind of physical connection" whereas the boys were "confused by it" but responded in "the way they would respond to that", namely as though it was a sexual approach (Mrs.F1_10.01.mp4, 10:03-15:57). She tried making a subtle, not entirely clear, distinction between a "physical connection" and a "sexual approach." It appeared that she believed the girls sought to establish some form of (hetero)sexual physical connection that was somehow not sexual, whereas the boys were more likely to seek a sexual relationship that possibly had less of a "physical connection."

These views seem to romanticize a notion of girls' as less sexualized beings than adolescent boys and suggest that boys might be driven more by hormones, (hetero)sexual urges, and the pursuit of (hetero)sexual/physical satisfaction than their female peers. This idea that seventh-grade girls need not focus on these desires for a physical or sexual connection were further reinforced by Mrs. Frost's comment that, "Nobody 12 needs to

be worried that she doesn't have a date. And nobody with a 12-year-old daughter really needs to be worried that she's not going to learn how to date and be a normal woman. She will. It doesn't have to happen in seventh grade” (Mrs.F1_10.01.mp4, 27:46-28:55).

Again, the view expressed here is that girls’ sexuality need not be explored in seventh-grade interactions and classrooms. In her opinion, such an outcome can be accomplished by removing boys from the room. Additionally, the idea that each girl will still ultimately learn how to “be a normal woman” suggests an implicit belief that normality involves dating and heterosexual urges and relationships.

Although Mrs. Frost believed the initial focus on maintaining the students’ (primarily girls’) childhood was accomplished through the creation of these single-gender classrooms, she discussed additional reasons to support these classes that she learned, and sought, as the years progressed. Both she and Ms. Small continued to read more about single-sex education and she readily admitted she was still “learning how to accommodate” the specific needs of the single-gender classes. The readings she completed, and workshops she attended, have contributed much to the second reason she provided for why students should be separated in school.

Brain Reasons: Boys and Girls are Different

Although they did not receive any pre-service training or professional development regarding how boys and girls differed or ways to pedagogically teach them in distinct ways, Mrs. Frost explained that they had read some items from Michael Gurian, articles from the Internet, and a cover story from *Newsweek* that supported their decision to separate the students. The bulk of the “support” supplied by these resources

was that they either noted other places that had “successfully” taught boys and girls separately or provided reasons why this separation was, or could be, beneficial for students. Mrs. Frost also explained that she was able to go to some workshops that were “eye-opening” and further strengthened her resolve that these classrooms were best for students. “We realized that there was so much brain research⁴⁵ that supported why [boys and girls] should be in these classes separately because the boys were learning things at a different rate, the girls were capable of different things than the boys were at that point” (Mrs.F1_10.01.mp4, 15:57-17:28). To her, a teacher can benefit from segregated classrooms because, “you can focus things in a way that gets to the needs of where the boys are and the way their brain works” (Mrs.F1_10.01.mp4, 28:55-30:43) and by extension, a teacher could focus her/his teaching in a way that best meets the girls’ needs too.

She reported several differences that were supported by “science” or “research” that she had learned from workshops or readings. These differences all stemmed from supposedly biological differences between boys and girls, including:

- “We know [boys] don't hear as well so you have to be a little louder, make sure you're nearer them when it's somebody that you really want to talk to.”
(Mrs.F1_10.01.mp4, 30:43-33:42)
- “We've, through some of the reading found out that if you give the boys strong powerful high-fives it helps develop dendrites.” (Mrs.F1_10.01.mp4, 30:43-33:42)

⁴⁵ I am choosing not to focus on the validity of the research being alluded to, but what matters in this work is that the teachers believe the research to be valid. Other writers (e.g., Bracey, 2006; Mead, 2008) focus on critiquing some of these “research findings” that often get quoted and used by advocates of single-sex education.

- “Boys have, I don’t know how many, twenty testosterone spikes during the day. And if you're aware of that you let them get up and move around so that [the testosterone is] used that way instead of with erections or something and then there's all that silliness about it.” (Mrs.F1_10.01.mp4, 30:43-33:42)
- “In terms of their verbal capacity, boys are about 18 months behind at this age...[By verbal capacity, I mean their ability to] communicate their thoughts and ideas verbally” (Mrs.F1_10.01.mp4, 38:39-39:38). She also explained, “We know that [boys] are less able to communicate, I was going to say their feelings but really they're less able to communicate period...I'm going to look at the boys' work with that kind of in mind. That he may need to rework a piece four or five times, to really be able to get the sentences to explain what it is he wants me to see in his writing, where it might only take a couple of revisions for a girl to do that. It's tougher for the boys to get those things that are written or verbal communications.” (Mrs.F1_10.01.mp4, 30:43-33:42)

At least one reason provided above, namely her desire to funnel boys' testosterone spikes away from erections, clearly overlapped with the idea of suppressing or lessening sex-related behaviors from entering classrooms; however, the “sex reasons” she mentioned were primarily aimed at protecting the girls, especially the young ones, who she did not think were ready for this behavior, whereas the “brain reasons” she highlighted seemed to focus on boys. Although she did not list anything from her readings or workshops that discussed how the girls' unique brains should lead to specific pedagogical changes for them, she noted that she had learned, “all these really interesting things that are just for the boys that may help them come along” (Mrs.F1_10.01.mp4, 30:43-33:42).

Boys Need Help

This “help” rhetoric suggested that the girls did not require her to alter her pedagogical approaches in order for them to perform well, whereas boys required changes in pedagogy to “help them come along,” primarily because of their deficiencies. This deficit perspective saw boys as needing more assistance because of their poor hearing, poor verbal capacity, and inability to control their frequent testosterone spikes. Such views impacted the identities that were constructed for boys and girls within this single-gender team. Boys were positioned as defective girls, which exactly echoed a sentiment expressed in a passage from the *Newsweek* cover story Mrs. Frost used to support her views for having single-gender classrooms. In this piece, the author wrote,

In elementary school classrooms—where teachers increasingly put an emphasis on language and a premium on sitting quietly and speaking in turn—the mismatch between boys and school can become painfully obvious. “Girl behavior becomes the gold standard,” says “Raising Cain” coauthor Thompson. “Boys are treated like defective girls.” (Tyre, 2006, p. 48)

Although the passage focuses on elementary classrooms, Mrs. Frost’s comments are similar and suggest that separating the sexes within her middle school might not do anything to lessen the view that boys are defective girls.

Elective: “Tomorrow’s Young Men and Women”

This idea that these single-gender teachers had a deficit perspective of boys can also be observed in the course description for an elective Ms. Small created and taught.

Each teacher facilitated one elective and although Mrs. Frost was asked to teach a skill-builder course for students who were under-performing in mathematics, Ms. Small created her own elective that, according to both Mrs. Frost and Principal Davis, aimed to impart students with social skills they were lacking. Principal Davis explained, “the goal of that class is to try to help youngsters to realize how they should conduct themselves” (Admin_10.01.mp4, 18:52-21:20) and the benefit of having one of the single-gender teachers leading it was that she could be aware of some gender-specific issues that might be overlooked by other teachers (Admin_11.01.mp4, 0:25-4:45).

Some of these gender-specific views can be gleaned from the course description for this class, entitled “Tomorrow’s Young Men and Women.” Although coeducational, like all other electives in the grade, it was the only class that listed a different description of the class for boys and girls in the course catalog. The description for this 10-week course read:

Girls—To assist girls in the development of their skills, talents, and abilities. To discuss where they are, where they want to go, and the process (work) necessary to get them there.

Boys—To assist males in their transition into young men. To help them see themselves differently; and in turn, the world will perceive them differently.

Ranging from conscience to etiquette, to dignity.

What do the different descriptions for boys and girls suggest about the identities that were constructed for these two categories of students? Why couldn’t the objectives for all students, both boys and girls, involve assisting them to develop their skills, talents, and abilities and discussing where they are, want to go, and the work needed to get there?

This description suggested that girls possessed skills, talents, and abilities, which needed to be more fully developed, whereas boys needed to “see themselves differently” such that “the world will perceive them differently.” Such language implies that boys needed to change, and possibly suppress or alter who they were and how the world saw them because something was wrong, or possibly defective, with them as they are.

Summary

According to Mrs. Frost, she and Ms. Small first sought to teach single-gender classes in order to lessen the amount of (hetero)sexual tension they noted in their classrooms. They were concerned with allowing students to be 12-year-olds without feeling “pressure to be too grown up too early” (Mrs.F1_10.01.mp4, 30:43-33:42) and seemed especially concerned with the girls’ exhibitions of their sexuality at such a young age, which they believed could be more appropriately explored and exhibited at later ages. As time progressed, they became aware of reported brain differences between boys and girls, which also supported the claim that students could benefit by being separated in classrooms because teachers could use specific approaches that might better fit the unique male or female brain. Most of the brain differences Mrs. Frost noted effectively positioned boys as defective girls and teachers needed to make adaptations to “help them come along” or the boys themselves needed to change in order for them to be successful and the world to “perceive them differently” than they are.

But did these messages influence students’ perspectives regarding why these classes existed? According to Mrs. Frost, when asked what she tells students at the start of the school year for why they are separated, she said, “We tell them kind of our

experience. I don't explain as much about the sexual tensions that I just explained to you, but just that we know that men and women learn things differently, that girls and boys learn things differently, that there isn't a very big difference in what they can do, but there is a big difference in how they do it. And so in order to accommodate that, we've made this decision" (Mrs.F1_10.01.mp4, 37:50-38:39). Although she and Ms. Small first explored single-sex classrooms as a means to stem the amount of sexual tension and behaviors that existed in the classrooms, she claimed not to explain this concern in much detail to students because she did not want to raise the topic of sex with them.

Such a decision is ironic because sex is central to the design of these single-sex classes. Sex in terms of (hetero)sexual relationships and behaviors was a prime cause for separating the students, and sex as an identity marker was used to label students as "boy" or "girl", or more possibly "not girl" and "not boy," in order to slot them into the "appropriate" sections in this team. Instead, when talking with students, Mrs. Frost claimed to more strongly emphasize differences between boys and girls as the rationale for these single-gender classes. Students' perspectives for the single-gender classrooms will provide more insight into their views on this topic.

Students' Explanations

When students were asked why their team has an all-boy and all-girl class, they cited comments they attributed to Mrs. Frost. They did not always agree with the statements she purportedly made (i.e., they did not all believe the said reasons were "good" reasons for separating the boys and girls) but they noted her explanations when discussing why the single-gender team was created and continues to exist today. During

these discussions, they often did more than simply relay Mrs. Frost's comments as they also responded to them. As a result, the following sections highlight the students' comments regarding the "sex reasons" and "brain reasons" she provided, and follow a similar format as this chapter's section titled, "Mrs. Frost," which detailed the reasons Mrs. Frost said these classes exist.

Sex Reasons: There was Too Much Sex Talk in Coed Classrooms

Students explained that Mrs. Frost told them there was a lot of sex talk and inappropriate behavior between the sexes in their coed classes such that it led her and Ms. Small to push for separating the boys and girls. Julie and Stephanie relayed that the girls in Mrs. Frost's early coed classes acted like "hootchies" by dressing and behaving in ways to seemingly impress the boys and obtain boyfriends. They said these girls constantly fought and argued over their relationships with different boys and Mrs. Frost wanted these behaviors to change and thought separating the boys and girls would help (10.23_SRT.mp4, 8:25-9:45). Although the single-gender classes might seem successful because Julie and Stephanie explained that these fights over boys do not take place in their single-gender classes, they told me that these fights still occur but just take place in the hallways (10.23_SRT.mp4, 8:25-9:45). They were also quick to point out that fights still take place within their all-girl class, but these fights are over friendships with other girls (10.23_SRT.mp4, 8:25-9:45). Therefore, the girls might not be arguing in the classroom over boys as much as when they were in coed classrooms, but the single-gender policy might only have changed the location where these fights take place. Although people could suggest that lessening the girls' focus on boys during class could

lead the girls to be more focused on academics, the girls' admission that they still fight in the classroom but the topic is now on same-sex friendships instead of "opposite"-sex romantic relationships could indicate that their overall focus on academics might not be enhanced simply because boys have been removed from the classroom.

Regardless, students regularly repeated Mrs. Frost's comments that there was much sexual talk and behaviors that took place within Mrs. Frost and Ms. Small's coeducational classrooms and the boys and girls were ultimately separated in hopes of lessening these behaviors. As Susan explained, "There was things going on between girls and guys that shouldn't be happening at school...And they wanted to see what would happen if girls and guys were separate in classes" (10.02_SRT.mp4, 9:45-14:40). This "want[ing] to see what would happen" was echoed by the boys as well, such as Ted who said the single-gender classes were "kind of like an experiment, but they found out that it [separating the boys and girls] works better. Cause, like, a little bit time ago, boys were talking, like, really sexual things and girls were too. So they decided to split it up one year. And it worked that one year so they've just been doing it ever since" (10.16_SRT.mp4, 6:55-10:25). These students attributed their ideas to comments Mrs. Frost had made to their classes at the start of the year. Interestingly, these reasons for separating the boys and girls did not note any academic benefit.

Most students did not explain, or said they did not know, what things were happening between boys and girls in these early coed classes Mrs. Frost and Ms. Small led. While no student refuted that Mrs. Frost said there was too much sexual talk or too many sexual behaviors in her coed classes, at least one student disputed whether such a claim were true (e.g., Heather said, "Mrs. Frost said something about [separating the boys

and girls] because she'd seen kids making out in the hallway. Well I don't believe that [students would do that] because you can get in so much trouble for hugging a person at school.""). Nevertheless, most students seemed to believe that these "inappropriate" behaviors had taken place even if they did not know exactly what these actions were. Juco, like other students, only labeled the behaviors as "inappropriate stuff" and "bad stuff," and said that Mrs. Frost told them, "if boys work with one another, they're not focusing on the other gender when they're doing their work" (10.11_Lunch.mp4, 7:15-8:35). The conveyed message was that the absence of the "opposite" sex would lessen the distractions posed by the students' (hetero)sexual interests. Conversely, some students could interpret these comments as suggesting that their behaviors in the presence of the "opposite" sex can adversely impact their learning. Either message implies that better academic conditions exist in single-sex settings relative to coeducational settings.

Brain Reasons: Boys and Girls are Different

In addition to citing the excessive, and inappropriate, sex talk as one reason why boys and girls were separated from each other on this team, multiple students explained that Mrs. Frost noted that differences between the sexes was part of the cause too. Although not all of these recalled differences were said to be rooted in the brain, many students discussed how Mrs. Frost said the girls had a more developed cerebral cortex than the boys. Jason explained that, "She was telling us that the girls develop their cerebral cortex [faster] and they get better" (09.27_SRT.mp4, 16:20-16:35), while Tammy explained that in the all-girl class they were told that, "The two halves of the brain have this connector thing that's growing through school, and stuff like that. And she

said that the girls' grow faster than the boys. Or something like that. I don't really understand what she meant" (10.05_SRT.mp4, 8:15-9:20). Although no student claimed to understand what Mrs. Frost "meant" (e.g., Jason said "I have no clue") they seemed both to view this "fact" and to use this "fact" as evidence and support for other beliefs about the differences between boys and girls.

For example, Tammy explained that since the "connector thing" grows slower for boys, "They mature at a slower pace than [girls]" (10.05_SRT.mp4, 8:15-9:20). No boy recalled being told there was a difference in maturity between boys and girls, but multiple girls reported these comments being said in their class. Anna explained that as a result of the boys' immaturity "they don't have a better understanding of the proper way to act" (10.08_Lunch.mp4, 8:05-10:42). She said, "you want them to understand, like, what's right and wrong, but you really can't... They, like, pound on the tables and stuff and they don't really know when to stop" (10.08_Lunch.mp4, 12:00-14:35).

Many of these girls attributed the noted differences in maturity to the overall differences in brain development between boys and girls. They recalled Mrs. Frost telling them that the girls' and boys' brains developed at different rates. Anna explained, "Their brains are behind ours... 18 months behind" (10.08_Lunch.mp4, 8:05-10:42) and when Mary talked about "the whole brain development thing" she recalled being told that the girls are "18 months ahead of guys" (10.02_SRT.mp4, 9:45-14:40). These comments seem to roughly echo Mrs. Frost's statements to me that, "In terms of their verbal capacity, boys are about 18 months behind at this age" (Mrs.F1_10.01.mp4, 38:39-39:38). Several boys also remembered Mrs. Frost telling them that girls' brains were more developed than their own, although these boys did not comment that the difference

was as large as 18 months. As Kevin explained, Ms. Small and Mrs. Frost, “read a couple books about brain activity: how it works, boys and girls. Girls are ahead of boys, by six months I think... Their brain is developed more than the boys” (10.01_SRT.mp4, 6:00-6:45).

But students were not told that boys were behind the girls in all areas. In fact, both boys and girls remembered Mrs. Frost saying that boys were more advanced in terms of muscle growth. Heather and Kristen explained that although Mrs. Frost told them girls were smarter, she also said boys were “two years ahead of us” in terms of strength. Therefore, they agreed that girls could perform better than boys in all school subjects, “except for gym cause they’re more strong.” (10.25_Lunch.mp4, 4:25-5:40). Steven similarly explained, “We have a better way of growing muscles and stuff” (09.27_SRT.mp4, 16:35-16:55).

In sum, Steven explained that boys and girls were, “equal in different ways” such that, “They [girls] have a better brain-wavicle thing... We [boys] have a better way of growing muscles” (09.27_SRT.mp4, 16:00-16:20). Keith seemed to summarize many of the ideas voiced through his peers’ comments when he explained, “guys are all muscles... girls are like, have all brains” (10.09_Lunch.mp4, 5:25-8:20). Another comment, which he attributed to his dad, summarized a perspective that was being endorsed about boys, namely, “All [boys’] brains are in our biceps” (10.09_Lunch.mp4, 5:25-8:20).

Conclusion

Principal Davis, Mrs. Kinsey, Mrs. Frost, and the students supplied varied perspectives for the existence of single-gender classes at P.D. James Middle School.

Table 5 highlights reasons that were voiced, and organizes them into the following categories: (1) financial, (2) socio-emotional, and (3) academic. In addition to claiming that the single-gender classes exist because of one or more of these reasons, a number of their comments discussed purported differences between seventh-grade boys and girls⁴⁶.

Table 6 organizes these differences into the following categories: (1) cognitive, (2) physical, and (3) behavioral.

⁴⁶ The first table, *Table 5*, includes some mention of differences that were claimed to exist between girls and boys (e.g., boys were “stimulated by the girls” in their coed classrooms, and it was implied that the girls were not similarly stimulated by other girls in the room), but does not include all differences that were noted. If the participant did not clearly state how or why a difference led to the creation or maintenance of the single-gender classes, it was not included in *Table 6*. For example, several students recalled Mrs. Frost telling them, while explaining why the single-gender classes existed, that girls’ brains were “ahead” of boys’ brains, but these students did not note why such a difference would suggest that the boys and girls should be separated. Differences of that sort (i.e., differences between the sexes that were mentioned during conversations surrounding the reasons for these single-gender classes, but were not said to be reasons for the existences of these classes) were included in the second table, *Table 6*.

Reasons for the single-gender classes according to different participants			
	Financial	Socio-emotional	Academic
Principal Davis	Retains and attracts parents to the school	Increases girls' confidence Increases girls' assertiveness	Increases girls' performance in math class
Mrs. Kinsey		Lessens girls' exposure to boys' "crude talking" since that "was stuff that girls didn't need to be hearing" Increases girls' and boys' comfort in classes	Increases girls' and boys' "learning capabilities" by: <ul style="list-style-type: none"> ▪ having the classes contain students of similar maturity levels (since "boys were less socially mature at this age level than the girls") ▪ lessening the amount of class time girls spent thinking about boys ▪ lessening the amount of class time boys spent "crude talking...[and] being stimulated by the girls" ▪ being "able to teach them [the boys and girls] differently"
Mrs. Frost		Lessens the amount of sex talk and tension in classrooms Maintains students' childhoods longer, especially protecting girls' (hetero)sexual innocence	Enhances students' academic learning by having them focus more attention on their academics instead of on sex talk and behaviors, as occurred in coed classrooms Helps boys by modifying some activities and approaches (e.g., talking louder or giving them powerful high-fives) geared specifically towards addressing their needs
Students		Lessens the amount of sex talk and behaviors in classrooms	

Table 5: Financial, socio-emotional, and academic reasons for the single-gender classes at P.D. James Middle School, according to different participants.

Differences between boys and girls according to different participants			
	Cognitive	Physical	Behavioral
Principal Davis			Girls are less likely to “speak up or be...assertive” when in coed classrooms
Mrs. Kinsey	Boys need to “let off some...testosterone...to be more focused ⁴⁷ ”		Girls are more mature than boys at this age Boys are stimulated by girls when in the presence of girls Girls think about “boys, boys, boys” when in the presence of boys
Mrs. Frost	Girls have a greater “verbal capacity” at this age	Girls have better hearing Boys cannot control their testosterone spikes, whereas no mention was made of girls’ or boys’ abilities to control other chemical levels	Girls seek more “physical connections,” while boys are more likely to seek “sexual” connections
Students	Girls’ brains are “ahead” of boys’ brains	Boys are more advanced in terms of muscle growth and strength	Girls mature at a faster pace than boys Girls have a better understanding of the “proper way to act” whereas “you [might] want [the boys] to understand...what’s right and wrong, but you really can’t”

Table 6: Cognitive, physical, and behavioral differences between boys and girls, according to different participants.

⁴⁷ It is unclear if Mrs. Kinsey meant that releasing some testosterone would enable the boys to better focus behaviorally, cognitively, or both.

Table 5 shows that Principal Davis was the only participant to mention a financial reason for these classes, and her other reasons focused on ways these classes could benefit the girls. She made no mention of socio-emotional or academic benefits for the boys. She, Mrs. Kinsey, Mrs. Frost, and the students all supplied socio-emotional explanations, many of which agreed with one another and seemed interrelated. For example, Mrs. Kinsey, Mrs. Frost, and students noted that the single-gender classes arose to lessen the amount of sex talk, or “crude talking” that was exchanged between boys and girls. According to Mrs. Frost, such a change would enable the students to maintain their childhood longer and she also connected this idea of lessening the amount of sex talk with an academic reason for these classes. According to her, the sex talk and behaviors that took place in her coed classrooms, “interfer[ed] with what they were supposed to be doing which was learning math and science and social studies and language arts.” She explained that by lessening students’ focus on sex talk and behaviors while in class, the single-gender classes led students to focus more attention on their academics and therefore enhanced their academic learning.

Similarly, Mrs. Kinsey claimed these classes were said to increase students’ “learning capabilities,” partially because these single-gender classes lessened the amount of class time the boys spent talking crudely and the girls spent thinking about boys. She also noted that their learning would benefit because these classes would allow the teachers to teach the boys and girls differently, thereby implying that boys and girls would benefit from sex-specific pedagogical approaches. In agreement with this idea of teaching the boys and girls differently, Mrs. Frost explained that separating the boys and girls enabled her to employ specific pedagogical modifications to “help [the boys] come

along” and better meet their needs (e.g., through talking louder, having them move around more often).

Based on what reasons were most repeated, these single-gender classes seemed to exist primarily to stem the amount of sex talk and behaviors that took place between boys and girls. Participants’ comments suggested that addressing these sex-related concerns would subsequently enhance students’ academic learning given that these academic benefits seemed to be a result of minimizing the sex behaviors. Their statements surrounding this issue of sex suggested an implicit belief that all the students were heterosexual. Such perspectives are further supported by several differences that were said to exist between boys and girls, namely that boys are “stimulated” by girls and girls “think[]” about “boys, boys, boys” when boys and girls are in each other’s presence.

Additionally, the view that boys were “stimulated” by girls whereas girls were “thinking” about boys, suggests that each sex was labeled as having slightly different heterosexual interests. Mrs. Kinsey’s comments suggested that the boys were physically stimulated by the girls, whereas the girls’ reaction to the boys was more cognitive in nature in that it seemed to lead them to “think[]” and potentially daydream about “boys, boys, boys.” Similarly, Mrs. Frost viewed the girls as seeking more physical, possibly romantic, connections with boys while she explained that the boys viewed these connections in more sexual terms. Mrs. Kinsey also explained that Mrs. Frost told her that boys had engaged in much “crude talking” when in coed classes, and that such talking was, “stuff that girls didn’t need to be hearing.” Therefore, the girls were further labeled as the more modest sex, more likely to have romantic interests, and more in need of being protected from the “opposite” sex’s sexuality.

Such behaviors, expressed by Mrs. Kinsey, seemed to be viewed as uncontrollable and distracting to academic learning, such that the only stated solution involved separating the girls and boys. Other behavioral, physical, and cognitive differences that were said to exist between the sexes are listed in *Table 6* and many of them were implicitly positioned as “natural” outcomes that were beyond the influence of the students, teachers, or their interactions. For example, the boys were said to be behind in terms of their verbal capacity, which was explained as their ability to communicate thoughts and ideas verbally, with no mention of how this capacity could be impacted by students’ experiences with reading and writing in school, at home, and elsewhere. As a result, the sexes were constructed as being naturally different from each other, possibly enabling the participants to feel that the decision to separate them into classes based on their biological sex was justified because there were more differences between them than just their genitalia.

The noted differences also constructed messages regarding what it meant to be a girl or boy in this single-gender team. As seen in *Table 6*, girls were said to have more developed brains, better hearing, greater verbal capacity, greater maturity, and more understanding of the “proper way to act,” whereas boys were said to be more advanced in terms of muscle growth and less able to focus unless they found means to release their testosterone. In addition to, or possibly because of, their lacking of cognitive and behavioral abilities exhibited by the girls, the boys were said to need help with their uncontrolled stimulation, lower maturity, worse verbal capacity, and worse hearing. Such purported differences seemingly endorsed a hierarchical ranking of the students, such that the girls were seen as better according to multiple measures.

CHAPTER 5: SAME CURRICULUM? SAME SCIENCE?

The previous chapter explored the reasons P.D. James Middle School contained a single-gender team, according to various participants, and highlighted differences between boys and girls that were voiced through these discussions. These perspectives presented perceived cognitive, physical, and behavioral differences between each sex of students, which further constructed who boys and girls were in this setting.

This chapter, and the two that follow it, focus on the single-gender science classrooms to investigate what it meant to learn science as boys and girls in this team. Events from science lessons, as well as participants' related comments, develop a more detailed picture of who boys and girls were constructed as being in this particular setting. The first two chapters make comparisons between the two classes as a whole, highlighting the perceived variability *between* the all-boy and all-girl classes, whereas the analyses discussed in the third chapter, Chapter 7, concentrate on *variability* within the individual classes.

As a result, the first two chapters provide insight into the cultures and identities developed in two-single-sex classrooms in this school. They explore how the classes and sexes were defined and experienced science, often relative to each other. They focus on some between-sex differences that were constructed and strengthened as evidenced through classroom events. Such differences might communicate different messages to students regarding science and gender, as well as the intersection between these two constructs. These messages have importance in terms of their potential impact on students' engagement, interest, or performance in science as well as their understandings

of what it means to be a boy or girl. The current chapter concentrates on whether the two classes experienced the same science and same curriculum, while the second chapter discusses the relationship between gender and interest in science.

Performance Between the Two Classes

At first glance, the all-girl and all-boy science classes might seem very similar given that the students in them performed similarly. Although Mrs. Kinsey had difficulty accessing the 2nd quarter grades after they had been electronically submitted to the district, she provided me with performance data for the other three marking quarters. Overall, at the end of the first marking quarter, the average grade in the girls' science class was 87% and the average grade in the boys' science class was 84%. In the third and fourth quarters, the difference between the classes was lessened. During the third quarter, the girls' averaged an 89% and the boys' an 88%, while in the fourth quarter the girls' averaged an 83% and the boys' an 82%.

As *Figures 2-4* show, the distribution of grades among students in the two classes was roughly comparable in the first quarter and then deviated a bit more in the third and fourth quarters. In the first quarter, almost the same percent of girls and boys received A's (37.9% vs. 37.5%). Although the girls' grades seemed to be more evenly distributed around a B, the boys' grades were primarily skewed by two students who received E's. Regardless, both classes saw the majority of their students receiving A's and B's in this quarter. Similarly, the majority of grades in both classes were A's and B's in the final two marking quarters. Although a larger percent of girls received A's these two quarters, they also had a larger percentage of students receiving the lower grades of C's, D's, and E's

while at least half of the boys received B's these quarters. Overall, the average performance between the two classes was similar based on the class means.

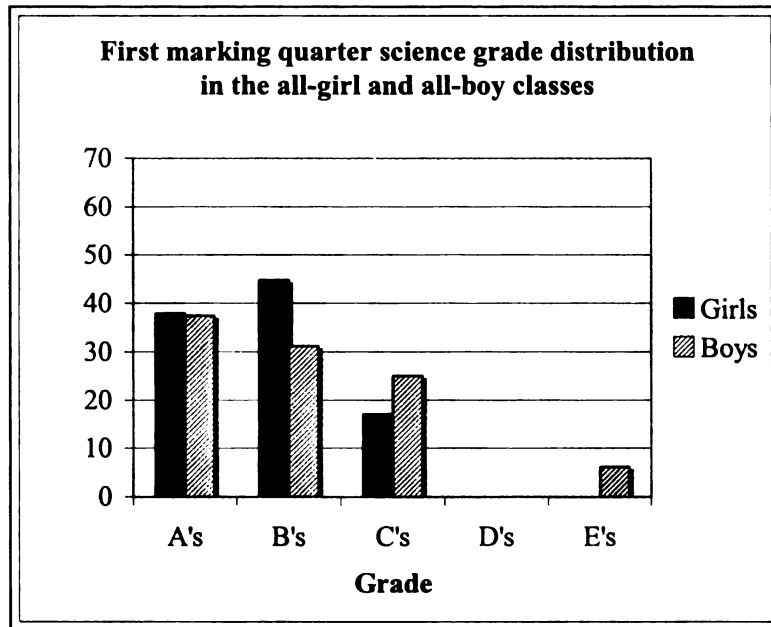


Figure 2: Percent of students in each science class who received A's, B's, C's, D's, and E's for the first marking quarter⁴⁸.

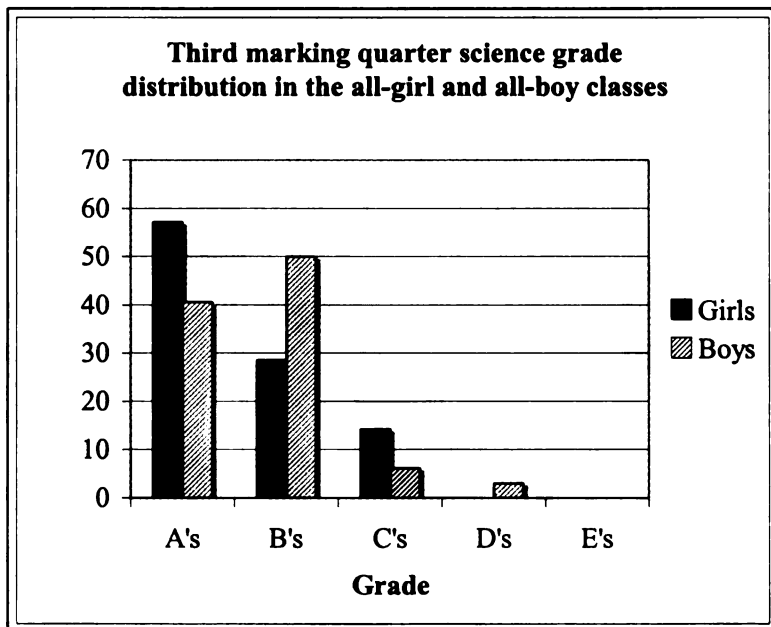


Figure 3: Percent of students in each science class who received A's, B's, C's, D's, and E's for the third marking quarter⁴⁹.

⁴⁸ In this quarter, 32 boys and 29 girls received science grades. One of the original 30 girls left the school before the marking quarter ended.

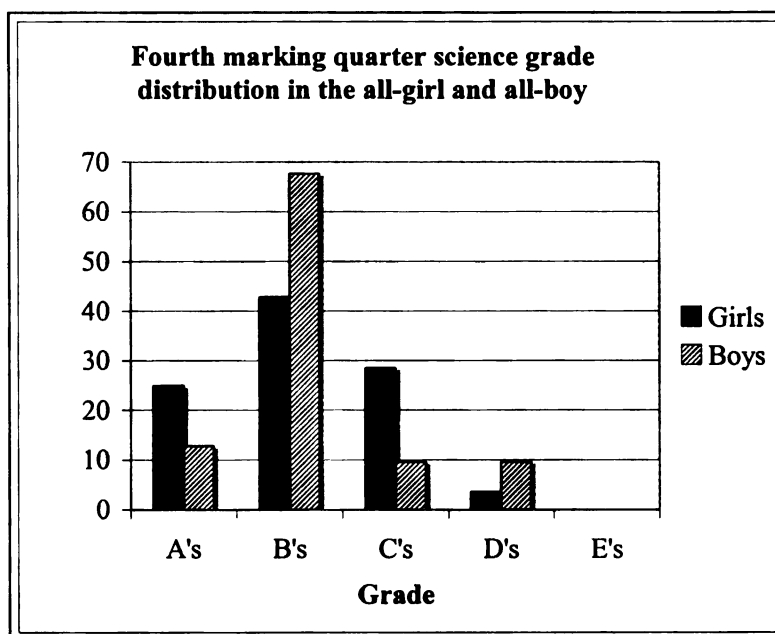


Figure 4: Percent of students in each science class who received A's, B's, C's, D's, and E's for the fourth marking quarter⁵⁰.

The data presented and discussed above suggest that students in the two classes performed similarly, but that need not mean that they learned the same things and were introduced to the same science. Mrs. Frost and Mrs. Kinsey commented about this idea of teaching the two classes the same content and said,

We have to teach the very same benchmarks. We have to teach the identical curriculum...And that's one of the ways we felt that we were really able to explain [the single-gender program] as a fair and equitable kind of a thing. Cause we're teaching the very same curriculum standards. We're teaching the, using the very same materials. But our approach to it

⁴⁹ The same 32 boys who received grades the first quarter, received grades the third quarter. Of the 29 girls who received grades the first quarter, only 28 received grades the third quarter since another girl left the school. Although 2 new girls joined this class since the end of the first quarter, the distribution was only evaluated for the 28 girls who had received first quarter grades from Mrs. Kinsey.

⁵⁰ Of the 32 boys who received grades first and third quarters, only 31 received grades the fourth quarter because one boy left the school. Of the 29 girls who received grades the first quarter, only 28 received grades the fourth quarter since another girl left the school. Although 2 new girls joined this class since the end of the first quarter, the distribution was only evaluated for the 28 girls who had received first quarter grades from Mrs. Kinsey.

can be different, so that we can try to accommodate the different needs that girls would have and boys would have.

--Mrs. Frost (Mrs.F1_10.01.mp4, 53:51-54:35)

By separating the genders and teaching them the same thing, you're allowing the girls...to feel comfortable and to be excited about learning about science in a girls' way, whether we have to reach them in a different way to get them interested in it, whether or not we have to tie science into something that relates to just girls to make it more interesting and to make them get good grades in it, to help them wanna learn more about it and to go into science fields...I'm not saying that that's necessarily what we've done yet, because I can't say that I've necessarily taught 'em that differently...But I think if that's the goal is to teach them differently to relate it, to give 'em personal experience, then it's a good goal...Like if you're talking about scientific facts, how can we tie this into your own personal experience being all girls...Like boys. Like you could say, "Okay, let's relate this to sports...Let's take this problem or this experiment and let's say we have three footballs that we were trying to find the mass, the volume, and the weight of three different brands."...And like for girls, "Okay, let's use makeup compacts."

--Mrs. Kinsey (Mrs.K6_11.02.mp4, 14:52-16:49)

As seen in the quotes above, both Mrs. Frost and Mrs. Kinsey claimed students were taught the same content, but that separating them could enable students to be taught in ways that might better accommodate the distinct needs or interests of girls and boys. Their statements essentialized the sexes through suggesting that boys and girls were uniform groups that had specific "needs" or "personal experiences." For Mrs. Kinsey, these "personal experiences" seemed related to interests she associated with members of each sex, such as sports or makeup. Although such views could appear to reinforce gender norms and expectations, she suggested that the use of these gender-specific items might enhance gender equity in science education and careers by increasing girls' interest and performance in science⁵¹. Regardless, she claimed "I can't say that I've necessarily

⁵¹ The topic of "interest in science," including these comments, will be addressed in more detail in Chapter 6.

taught 'em that differently” and that she was “teaching them the same thing.” But were the lessons and messages that were communicated comparable? I will discuss excerpts from one classroom activity to explore whether boys and girls were taught “the same thing.”

This particular lesson, which focused on the five characteristics of living things, was selected for more detailed analysis because it was from the first week in which I videotaped classes and therefore provided me with a great deal of data (e.g., field notes, audio data, and video data) that enabled me to review more of the classroom happenings and strengthen claims. The differences between the classes that will be noted were not unique to this lesson and I will include data from additional lessons to support this claim.

Five Characteristics of Living Things

Students' Lists

At the start of the unit on cells, Mrs. Kinsey introduced the “five characteristics of living things.” Before displaying these characteristics for the students to record, students compiled their own lists of “what a living thing needs to be considered living.” In each class, students stated items they recorded. Below are excerpts from analogous portions of the activity in the all-girl and all-boy classes. Since the boys' class met earlier in the day than the girls, and Mrs. Kinsey might have modified the girls' lesson as a result of her experiences with the boys, I will present events from the boys' class first.

In the all-boy class⁵²:

Mrs. K: Alright. Raise your hand and tell me one of the things you guys put that to be alive you need (*Several students raise their hands*). Allen.

⁵² Video: *Per2_Boys_front09.28.mp4*: 21:44-23:43; or *Per2_Boys_back09.28.mp4*, 20:54-22:53

Allen: Well, oxygen, I mean a heart sort of.
Mitch (*without being called on*): Trees don't have hearts.
Allen: Yeah they do. In stories.
Mrs. K: I want him to list something that is needed. Don't tell him he's "right" or "wrong." It's not your job.
Allen: Wouldn't they need a heart? To circulate blood and stuff?
Mrs. K: I guess, as in the words of Mitch, "Do trees have hearts?"
Allen: No.
Steven: Yeah. They do.
Mrs. K: Okay? So think about it. Jason.
Jason: Oxygen.
Mrs. K: Oxygen. (*To Allen:*) I'm not saying you're wrong, I'm just saying to ask that question, "Do trees have hearts?"...David.
David: Shelter.
Mrs. K: Shelter.
Mitch: Trees don't have shelter.
Another student: You don't need shelter to live.
Student: Yeah you do. (*Echoed by a few others*)
Brian: Trees have bark (*Class gets louder as boys discuss different contributions*)...
Mrs. K: Boys I'll wait...Steven.
Steven: Tissue.
Mrs. K: Tissue.
Brian: I didn't think; Do trees have tissue?
Steven: Yeah. Bark.
Mrs. K: Alright. Actually yes, they do.

In the all-girl class⁵³:

Mrs. K: Alright girls. Raise your hand and give me one thing on your list.
(Several students raise their hands). Julie.
Julie: A pulse.
Mrs. K: A pulse.
Dana (*without being called on*): A brain.
Mrs. K: A brain.
Abby (*without being called on*): Veins. Cells.
Another student (*without being called on*): Water.
(Other girls state things from their lists without being called on.)
Mrs. K: Whoa! Wait. Stop. Raise your hand. Abby you said?
Abby: Veins and —
Mrs. K: —veins. Tanisha.
Abby: —and cells.
Tanisha: Cells.
Mrs. K: Cells. Mary.
Mary: Reproductive system.

⁵³ Video: *Per4_Girls_front09.28.mp4*: 34:01-34:30 or *Per4_Girls_back09.28.mp4*: 33:23-33:52

Mrs. K: Reproductive system. Susan.

Susan: Um (*pauses*), core.

Mrs. K: Core?

Susan: Core.

Mrs. K: A core. Okay.

Similarities

These excerpts show several similarities between the lessons that developed in the two classes. Mrs. Kinsey's objective seemed the same as she sought to generate a verbal list of items students had recorded, before she introduced the "correct" answers. She wanted only one student to speak at a time and did not want students to evaluate peers' contributions. She limited their contributions by having them state "one thing" from their lists and positioned herself as the primary evaluator who directed students' participation through selecting when and who gained access to the official classroom discourse space. She validated contributions through repeating them aloud and then moved on to the next student. In both classes, students contributed responses without waiting to be recognized. These characteristics, present in these excerpts, were common in many whole class discussions in both classes; however, there were several differences between the lessons.

Differences: Discourses and Approaches Towards Science

The girls listed items without any discussion surrounding their contributions. Conversely, the boys' engaged in some analyses of several responses, primarily through challenging them. When Allen first suggested "hearts," Mitch interjected "Trees don't have hearts." Although Mitch was reprimanded for evaluating a peers' response, his comment was validated when Mrs. Kinsey used his idea and credited him by saying, "As in the words of Mitch, 'Do trees have hearts?'" As additional responses were supplied,

students and Mrs. Kinsey continued to use this analytic tool to inspect other contributions. When Brian questioned another student's response of "tissue" by asking, "Do trees have tissue?" Mrs. Kinsey replied "Yes, they do." Additionally, several students vocalized their opinion opposing the one offered by a student who said, "You don't need shelter to live." Afterwards, the students became very animated as they were heard discussing different answers with their peers. Although Mrs. Kinsey had told the boys that their jobs were not to evaluate whether responses were "right" or "wrong," the students employed means to explore the various contributions and Mrs. Kinsey even adopted this tactic by using the question, "Do trees have [item]?" and responding to a student who posed such a question.

The boys were seen to more likely challenge others' comments and asked to defend their opinions. After Mitch first challenged Allen, other boys and the teacher, Mrs. Kinsey, pushed other students to defend their contributions by countering comments with questions or opposing statements. Therefore, this analytic and argumentative discourse was co-constructed among students and teacher in the boys' class and was not something Mrs. Kinsey initially tried to introduce or facilitate in this space. Conversely, in the girls' class, neither the girls nor Mrs. Kinsey challenged students to defend their responses. Such a difference suggests that these classes were being exposed to different ways of doing science in that they were getting different experience with argumentation. In order to explore whether these discursive differences were isolated to this one excerpt, I will explain how I conceptually and operationally defined argumentation and used these definitions to code whole-class discussions from multiple lessons.

Argumentation

As noted in my conceptual framework introduced in Chapter 1, from a sociocultural perspective learning in a classroom involves the reorganizing and strengthening of practices that are valued and exhibited in that space (Cobb & Bowers 1999; Greeno, Collins, & Resnick, 1996). Through science classroom experiences, students become exposed to the discursive practices that are valued in these contexts, and their fluency with them can greatly influence their performance and participation, their conceptions of science as a discipline, and their understanding of themselves as members of this community (Kelly, 2007; Lemke, 1990; Wenger, 1998). One such practice, “argumentation,” has become popular in science education research because it is deemed central to Western science and adheres to many science standards (Driver, Newton, & Osborne, 2000; National Research Council, 1996; Sadler, 2006).

Argumentation can have different meanings depending on the perspective employed. A cognitive perspective views argumentation as the articulation and expression of informal reasoning, whereas a sociocultural perspective posits that argumentation is not simply the expression of reasoning, where reasoning is the important process and argumentation is just “a reporting mechanism” (Sadler, 2006, p. 325). Instead, a sociocultural framework views argumentation as part of a social practice that is used to persuade other people of claims (Clark & Sampson, 2007). It “refers to the ways that evidence is used in reasoning” (Kelly, 2007, p. 453) and “in a sociocultural framework, argumentation assumes a fundamental position in the collective process of making meaning and affecting learning” (Sadler, 2006, p. 325). It is this sociocultural perspective that I applied to my analyses of argumentation in these lessons.

Analyzing multiple lessons

To explore whether the discursive differences noted in the above excerpt from the “Five Characteristics of Living Things” lesson was unique, I examined one day of science from the six successive weeks in which I videotaped lessons. The lessons selected were ones that had students engaged in an array of activities, including lab work, individual work done at their seats, and whole-class discussions. I omitted lessons where students spent part of the period completing tests or quizzes, and chose lessons that I thought would involve much discussion. I ultimately analyzed over 7 hours of lessons from the boys’ class and over 7 hours of lessons from the girls’ class⁵⁴.

Argumentation was defined as a discursive event involving two or more participants, at least one of whom was Mrs. Kinsey, that involved a “challenge” and a “defense.” A “challenge” was operationally defined as any verbal claim⁵⁵ that opposed another voiced perspective, while a “defense” involved the invoking of utterances to support the initial or opposing claim. These “defenses” need not invoke scientifically correct information, but could be used by a participant as evidence or reasons a claim was said to be true or false. These two behaviors, “challenge” and “defense,” needed to occur in the same exchange in order for it to be coded as an “instance of argumentation.” For example, later during the lesson that focused on the five characteristics of living things (in a transcript that will be discussed in more detail below, in the section titled, “Mrs.

⁵⁴ As noted earlier, each day of science did not comprise the same amount of class time since Mrs. Kinsey often devoted two periods to science on Tuesdays and Thursdays but only one period to science on Fridays. Additionally, class periods were shortened the weeks when students spent their morning completing state tests.

⁵⁵ “Claims” here are defined similarly to how Toulmin (1958) defined this term. It refers to any conclusions whose merits must be established.

Kinsey's List"), Dana "challenged" Linda's comment that rocks breathe by saying "Rocks don't breathe silly!" Since neither she nor Linda provided a reason for their perspective, no "defense" was enacted and this exchange was not coded as an instance of argumentation⁵⁶. Conversely, in the boys' class, Mitch "challenged" Allen's response that all living things need hearts by saying, "Trees don't have hearts" and Allen "defended" his initial claim (albeit questioningly) by saying, "Wouldn't they need a heart? To circulate blood and stuff?" This exchange was coded as an instance of argumentation since Allen explained his reason for saying "heart" by suggesting that a heart would be necessary for a living thing to circulate blood.

In order to code consistently and to focus on a specific phenomena, these operational definitions were applied to all analyzed lessons. Likewise, several additional decisions were made:

- I reviewed all lessons from the same vantage point (the camera located at the back of the room) so that they roughly captured the same amount of audio data.
- I only coded discursive events that transpired during whole-class discussions because exchanges that took place among groups of students might have been observed in one class thanks to where the exchange occurred relative to the video camera, but not noted in the other class because the exchange took place far away

⁵⁶ A number of "challenges" were not accompanied by a "defense," especially instances when Mrs. Kinsey evaluated a student's response as incorrect without providing any explanation, or "defense," as to why it was incorrect. For example, in another lesson, when Mrs. Kinsey was discussing the results of a lab she asked the class, "If [the balloon on] Bottle C is the only one that is supposed to rise, why might [one group's] balloon for Bottle B be rising?" and one student said, "It's not empty all the way." Mrs. Kinsey replied "No," thereby opposing the student's explanation for why the balloon on Bottle B rose, but she did not "defend" her answer by explaining why she opposed his answer. Instead, she pursued other responses (Per2_Boys_back_10.30.mp4, 7:20-8:55).

from the camera⁵⁷. Additionally, whole-class discussions were assumed to be heard by all members of the class and were implicitly validated as legitimated ways to talk in science class.

- I only coded discursive events in which Mrs. Kinsey was an active verbal participant in the exchange. This decision was made, in part, for the same reasons supplied for the bullet point above. I did not wish to code “side conversations” that I could hear in one class because of where specific students were seated relative to the camera without being able to code similar conversations that took place in that class or in the other class. Additionally, I felt it was important to focus on events in which Mrs. Kinsey verbally participated because these events would be instances when the acts of “challenging” and “defending” were exhibited, and thereby legitimated, by the dominant authority figure in the room.
- To be coded as an instance of argumentation, the “challenge” and “defense” must focus on science content. For example, when Mrs. Kinsey told the girls that they would resume their regular class schedule the following week because they would be done with the state tests, some girls “challenged” her by saying that the testing schedule would remain in place since sixth and eighth graders would still be taking tests (Per4_Girls_back10.19.mp4, 42:00-44:25). Although this exchange involved a “challenge” and “defense,” I wanted to focus my analyses to instances of argumentation around science content.

⁵⁷ If this decision were not made, the data could be greatly skewed depending where students sat relative to the video camera, especially given that the camera often moved throughout the room during lab work.

Results

Table 7 records the number of instances of argumentation that were noted in the six analyzed days of science⁵⁸, as well as titles I created that summarized the focus of each lesson. In total, the boys' class contained more than three times as many instances of argumentation (22 compared with 7) over these six days. They had more argumentation than the girls' class on five of the six days and the two classes contained the same number of instances of argumentation on that sixth day. This data suggests that a discursive difference between the classes was evident among multiple lessons and the above excerpt from the lesson on the five characteristics of living things was not a unique instance of a difference between the classes. Instead, these analyses suggest that the boys were granted greater exposure to argumentation and the practice of challenging and defending claims. Such experiences might benefit them in future science courses or careers, given the value placed on these practices in science.

⁵⁸ The titles of the videos reviewed, along with their lengths in parentheses, are:
"Per2_Boys_back09.28.mp4" (60:00) and "Per4_Girls_back09.28.mp4" (54:16)
"Per1_Boys_back10.02.mp4" (49:37), "Per2_Boys_back10.02.mp4" (64:35),
"Per3_Girls_back10.02.mp4" (54:00) and "Per4_Girls_back10.02.mp4" (51:41)
"Per12_Boys_back10.09.mp4" (69:28) and "Per34_Girls_back10.09.mp4" (65:50)
"Per1_Boys_back10.19.mp4" (56:02) and "Per4_Girls_back10.19.mp4" (50:24)
"Per2_Boys_back10.26.mp4" (48:51) and "Per4_Girls_back10.26.mp4" (50:40)
"Per1_Boys_back10.30.mp4" (65:40), "Per2_Boys_back10.30.mp4" (47:21),
"Per3_Girls_back10.30.mp4" (53:47), and "Per4_Girls_back10.30.mp4" (53:30)

Number of instances of argumentation during different science lessons			
Day	Title Given to the Lesson	Instances of Argumentation in:	
		All-boy class	All-girl class
Sept. 28	Five Characteristics of Living Things	8	2
Oct. 2	Blob Activity and Notes on Organelles	3	1
Oct. 9	“Identi-Cell” Activity	2	0
Oct. 19	Organelles under a Scope and Quiz Review	2	2
Oct. 26	Lab Roles and Notes on Osmosis and Diffusion	3	1
Oct. 30	Energy Waste Activity and Report	4	1
Total		22	7

Table 7: Number of instances of argumentation in the all-boy class and all-girl class for six days’ of science.

Although argumentation is deemed to be important in Western science and meets many science standards, it is worth reminding readers that when Mitch first challenged Allen’s answer that living things have hearts, Mrs. Kinsey reprimanded him for this behavior. Similarly, there were other instances where she seemed to discourage arguing between and among students. In fact, she explicitly told a boy who expressed disagreement with a peer, “Don’t argue with anyone” (Per2_Boys_back09.28.mp4, 15:30-16:30). Therefore, it is possible that Mrs. Kinsey might not have valued argumentation and might have viewed the boys and their class less favorably because they engaged in this practice more regularly than the girls and their class. No interview questions specifically focused on this practice, thereby lessening my ability to make this claim with confidence. Regardless, this claim would coincide with the general perspective that the boys’ were the worse students, while the girls’ were better student, both behaviorally and academically.

Returning to the lesson on the five characteristics of living things, we can continue to examine ways in which the two classes experienced science similarly and

differently. The preceding vignettes from this lesson provided insight into how the two classes covered a similar portion of the lesson, but might have been developing different academic skills and been sent different messages regarding science, such as how science is discussed. Although the boys were exposed to some tools that are valuable in science, additional messages were seemingly communicated that they were not good students. These messages become more evident in the next portion of the same lesson.

Mrs. Kinsey's List

When Mrs. Kinsey no longer asked students to contribute additional responses, she had them flip over the data sheet they used the previous day. The back of this sheet was titled, "Five Characteristics of Living Things" and they were to record the "correct" answers for "what a living thing needs to be considered living." Below are excerpts from each classroom:

In the all-boy class⁵⁹:

Five boys did not have these sheets and Mrs. K walks around, giving them another copy. She does not tell other boys what they should be doing. They talk. It takes over two minutes until she resumes lecturing.

Mrs. K (*Growing frustrated with the noise level*): Boys! Put your heads down! (*She continues working with the boys who need the sheet and occasionally reprimands students who have their heads raised.*)

Juco (*When Mrs. Kinsey's back is turned, he looks towards one of the cameras and says, somewhat quietly*): We're in jail...We're getting robbed. We're getting robbed...By a teacher!

Mrs. K (*Returning to the front of the class, which has largely quieted down*): Alright. This is the; I'm gonna give you – (*A few students make loud sounds.*) Boys. Stand up! Everybody stand up! Go out into the hall. (*The boys stand, walk into the hallway, and line up against the wall. Talking to the boys in the hall:*) When you guys are ready to go walk in the classroom quietly and quickly, we'll go back in...I am not gonna keep asking you to stop talking and just sit quietly until we move on...Walk

⁵⁹ Video: *Per2_Boys_front09.28.mp4*: 23:43-35:48; or *Per2_Boys_back09.28.mp4*, 22:53-34:58

back in the classroom. Sit in your seat. And do not talk. Or we'll do it again. Go on. *(After returning to the room:)* Alright... Take a look at the back page of your data table that you did yesterday. Okay? Flip it over. Everybody there? "The Five Living Things", okay? The five characteristics of living things. *(Students search for that sheet in their binders or folders.)*

Juco: This one *(he holds up a sheet of paper)?*

Mrs. K: Yes Juco. *(Turns on the overhead projector. No text is projected. The class is relatively quiet and well behaved.)*... Okay. In order to be alive, you need to have these five life functions. Okay?...

Wesley: We have to write that down?

Mrs. K: Yes. Okay? Five characteristics of living things. Your directions are to *(reading from the sheet the students have out)*, "Name all five of the characteristics of living things. Make sure you write the entire characteristic and feel free to include explanations and examples of these characteristics." Okay? For example, number one, it needs to grow. Something grows...

Rick: Shouldn't Tommy be dead then? On *Rugrats*? He doesn't grow.

Mrs. K: He obviously had to grow some.

Rick: Well he didn't. Cause, like, the episodes were made from '96 to, like, 2003 and he never grew.

Mrs. K: He's a cartoon. *(Several students start talking about Rick's comment. The volume increases.)* Boys! Write it down! *(When the noise level does not seem to change much after one second, she shuts off the projector.)* Stand up. *(The boys stand and head out the door without being told.)*

In the all-girl class⁶⁰:

Mrs. K: Is a tree a living thing?

Some students: No.

Some students: Yes.

Mrs. K: Ooo. I heard a couple people say "no"... Is a flower a living thing?

Many students: Yes.

One student: No.

Julie: They had in a book that rocks were living too.

Linda: They breathe.

Dana: Rocks don't breathe silly!

Mrs. K: Alright. *(Many girls continue talking, even when Mrs. Kinsey speaks.)* Why do you say – Girls! Focus *(She snaps her fingers three times. Many girls keep talking and the volume does not noticeably change.)*... Raise your hand if you don't think trees and plants are living things. *(Many girls quiet down.)*... I heard a couple people say "no." *(Several students comment aloud:)*

Dana: Trees are living.

Tameca: I said "no."

⁶⁰ Video: *Per4_Girls_front09.28.mp4: 35:35-39:29* or *Per4_Girls_back09.28.mp4: 34:57-38:51*

Dana: Yeah, Linda said it (*Several girls raise their voices and their comments overlay atop each other. Some girls accuse others of, or of not, saying certain responses.*) Linda said it out of stupidity.

Linda: No I didn't!

Mrs. K: Girls. I'll wait. (*The class gets quieter.*) Okay. (*Turns on overhead projector. No text is projected.*) Trees are living things. If you take a look up here at this, these are; I want you to open up your course pack. On the back of your data table from yesterday, you're gonna see where it says, "Five Functions of Living Things." Or "Five Life Functions." (*Some girls look through their papers for the desired sheet. Others do not.*) Girls. I'm waiting. Girls! I'm waiting for you to open your book. The whole class is waiting.

Latesha: Did you say what page it was in our course pack?

Mrs. K: "The Five Charac, Characteristics of Living Things."...(*Students continue getting out their sheets. Some engage in discernible social conversations that are not about the science content.*) Girls! I'm waiting. (*pauses*) Alright. Five – Dana. You're disrupting my class. Would you like to stay or would you like to leave?

Dana: Stay.

Mrs. K: Okay. I'm glad. Is there anyone else that's disrupting the class that would like to leave before I begin?

Tameca: Where would they go?

Mrs. K: The office. To call their parents and explain to them why they're in the office and not in class. Alright. Five life functions. Okay. Your sheet says, "Five characteristics of living things." The first one that you need to be considered a living thing is you need to be able to grow (*She unveils a portion of the transparency.*). Something grows. Okay?...

Michelle: Do we have to write this down?

Mrs. K: Yeah. (*A number of girls are talking socially. Tracy and Dana are talking about Dana's dog, "Marshmallow."*). Tracy. Dana. Last time. Don't talk. (*Mrs. K then moves to the next characteristic.*)

Similarities

There were several similarities between the two classes. In both, the students seemed more talkative and less focused on this activity compared with when they were presenting items from their individual lists. Whether it was through sending the class into the hallway or snapping her fingers, Mrs. Kinsey felt that both the boys and girls needed to be quieted down, and their attention shifted elsewhere. Both classes were threatened with punishment for their collective or individual behavior. The two classes were

ultimately introduced to the same “content” in that they were shown the identical transparency with the same information about the five characteristics of living things. Additionally, there were students in both classes who did not have the appropriate sheet with them and individual students were called out for behaving in ways that Mrs. Kinsey did not want; however, the vignettes contained important differences.

Differences: Discourses and Approaches Towards Science

Earlier in the lesson, the boys’ class discussed trees as living things and now this part of the lesson contained related dialogue in the girls’ class. The girls had science after the boys and Mrs. Kinsey might have found the boys’ comments regarding trees valuable. As opposed to its use in the boys’ class, these comments were not introduced when girls presented items from their lists, as a means to evaluate responses and “defend” claims. Instead, this topic was introduced as a “yes/no” question. When Mrs. Kinsey was unable to locate who said trees and plants were not living, she did not ask others to “defend” their response regarding why they believed trees should be viewed as living. Ultimately, the question was not explored in much detail in the girls’ class and did not noticeably advance the conversation concerning characteristics of living things.

Similarly, this portion of the lesson contained instances where girls disagreed with others’ responses, thereby “challenging” claims, but there were no accompanying “defenses.” When the boys expressed disagreement and “challenged” responses, they were more likely to “defend” their claim and provide evidence that countered the initial claim (e.g., “Shouldn’t Tommy be dead then?...He doesn’t grow.”), whereas the girls

were only seen to make opposing claims without supplying evidence (e.g., “Rocks don’t breathe silly!”).

Although the girls who initially said trees and flowers were not living might not have been serious, they neither stated that they were joking nor voiced the reasoning for their initial response. The absence of boys did not seemingly enhance the likelihood that they would put themselves “on the line” and assert their perspectives, guesses, or even claim to have been joking. These results contradict some of the purported benefits of these classes, as voiced by Principal Davis and Mrs. Frost. When explaining why the single-gender program was initiated, Principal Davis explained that the teachers, “were seeing some issues with how girls, in general, would not speak up or be as assertive in the classroom when they were in the mixed gender classes” (Admin_10.01.mp4, 3:43-6:23). Similarly, Mrs. Frost claimed that, “It was true that when the girls were mixed in with the boys they were reluctant to make guesses and predictions...They were just less interested in putting themselves on the line...The girls don't have that any more, obviously” (Mrs.F1_10.01.mp4, 15:57-17:28). Although she stated that “the girls don’t have that any more, obviously,” it seemed that some girls were still unlikely to explain their position and comments, even in single-sex classrooms, whereas the boys exhibited greater comfort explaining their views through providing evidence.

Differences: Mrs. Kinsey’s Response to Each Class’s “Misbehavior”

Although Mrs. Kinsey grew frustrated with students’ behaviors in both classes, an important difference revolved around how she responded to these events. When addressing the entire class of girls, she told them to focus and snapped her fingers in an

attempt to get their attention. When Dana loudly claimed that a classmate made a comment “out of stupidity,” Mrs. Kinsey did not reprimand her. But she reprimanded Mitch, who was considering the content, when he challenged a peer’s response by saying “Trees don’t have hearts.” When Dana had ultimately crossed a line with the teacher, Mrs. Kinsey gave her a (rhetorical) question and option of whether or not she would like to individually stay or leave the classroom. Mrs. Kinsey then extended that question to the other girls; however, no such option was presented to the boys. Instead, when she grew frustrated in that class she had them all place their heads on tables and reprimanded individuals who raised their heads. Later, when only a few students made loud sounds, the entire classroom of boys was sent to the hall and told that they should “not talk...or we’ll [enter the hall] again.” A short time later, when the boys begin talking again, seemingly about the content, she had them return to the hall. She seemed less patient with the boys who were only told, “I’ll wait” or “I’m waiting” once in these excerpts, whereas the girls heard these expressions four times.

As a result of these differences, the boys might have begun to see themselves as the more disruptive group and that their behaviors were more inappropriate and misaligned with class norms and expectations. As Ted explained, “we [the boys] are kind of obnoxious” (10.11_SRT.mp4, 7:00-9:05) and Brian expressed the belief that, “The teachers don’t really like guys that much” (10.10_Lunch.mp4, 3:35-5:10). Several girls agreed that the teachers liked them more than the boys. For example, Heather recalled Mrs. Frost telling the girls’ class, “I don’t want the guys to come in here. You guys [the class of girls] are so good” (10.25_Lunch.mp4, 8:50-9:25). Additionally, in an interview with Mrs. Kinsey, she surmised that no other teachers taught single-gender classes at the

school, in part, because, “Maybe they think 32 boys in one classroom (*places hands over eyes*), “What are they thinking!” Kind of like I think sometimes” (Mrs.K1_09.27.mp4, 45:25-46:05). The belief that boys were more difficult, obnoxious, or disliked could have been further constructed and reinforced when the boys received harsher consequences and were given smaller leeway for their real or perceived misbehavior.

Differences: Consequences for Misbehavior and Their Effect on Teaching Time

In addition to showing greater patience with the girls’ behaviors than those behaviors expressed by the boys, Mrs. Kinsey invoked different consequences when the two classes ultimately went too far. Both classes seemed to talk similar amounts, but all of the boys were told to place their heads down and all were sent into the hallway, whereas the girls were individually given the option of leaving the classroom and going to the main office. These actions suggest that the girls were treated more as individuals, while the boys were grouped as a uniform block.

Also, these markedly distinct strategies for handling undesired behavior comprised different amounts of class time. The entire exchange from when Mrs. Kinsey told Dana, “You’re disrupting my class” to when she resumed the lesson with, “Your sheet says” took almost 30 seconds⁶¹. Conversely, the amount of time spent off lesson in the boys’ class due to the excursions into the hallway comprised approximately 8 minutes⁶². Therefore, in addition to being sent messages about how they were valued or viewed as students or behavioral concerns, the different consequences did not take comparable amounts of class time and could impact the classes’ opportunities to learn

⁶¹ Video: *Per4_Girls_front*09.28.mp4: 38:12-38:41 or *Per4_Girls_back*09.28.mp4: 37:34-38:03

science. In this instance, the response to the girls comprised less than 1% of the class period while the consequences for the boys took approximately 15% of their class period. As a result, the girls' class might have had more opportunities to learn science and focus on the academic lessons.

These behaviors and consequences were not unique to this particular excerpt. During the 22 days in which I observed science lessons being presented, the boys were told to place their heads down seven times while the girls were asked to do it twice. The boys were sent into the hall six times and the girls were never sent into the hall (see *Table 8*). Although Mrs. Kinsey stated her belief that students in the two classes were off task the same amount, she said “They just do it in a different manner, and I think it just depends on your tolerance or what bothers you...as a teacher...The boys distract me more” (Mrs.K2a_10.17.07.mp4, 14:33-15:15). Therefore, although Mrs. Kinsey acknowledged that both classes possibly needed to be redirected just as frequently, she might have treated them differently, seemingly penalizing the boys more because their actions bothered her more.

Number of times each science class experienced specific behavioral consequences		
	All-boy class	All-girl class
Told to place heads down	7	2
Sent into the hall	6	0

Table 8: Number of times each class was told to place their heads down or enter the hallway when I observed science lessons.

Conclusion

The two classes progressed through similar lessons and could be said to have been taught the “same benchmarks.” But the discussions and actions that took place during

⁶² Video: *Per2_Boys_front09.28.mp4*: 27:06-33:36; or *Per2_Boys_back09.28.mp4*, 26:15-32:45 and

these analyzed lessons differed in noticeable ways and might have impacted what students were understanding about science and themselves. The boys regularly exhibited a greater likelihood to engage in argumentation, which could grant the boys greater opportunities and comfort with a skill that is valued within scientific communities. Although the boys might benefit from these experiences, they could be acquiring messages that they were worse students, which might lead them to become less engaged in schooling. The girls might not be aware that the absence of argumentation could be detrimental to their science education, and opportunities in the future, but they were being sent more positive messages about their academic and social behaviors in the classroom.

Similarly, the two classes were treated differently when they were perceived to engage in off-task behavior. Mrs. Kinsey claimed that both classes needed direction regarding what was expected of them in class, but “when I need to collect [the girls], they quickly bounce back and they’re ready to work...They need direction, but when you go to give it, they’re ready to listen...The boys...you can say it fifteen thousand times and then you have to say ‘Put your heads down.’” (Mrs.K1_09.27.mp4, 1:00:50-1:02:05). Clearly, Mrs. Kinsey embellished her figure of “fifteen thousand times,” but she definitely expressed frustration with dealing with the boys and admitted that she found their behaviors more distracting.

Whether the boys were seen as “obnoxious⁶³,” or possibly younger and less mature⁶⁴, the girls were told they were the “good⁶⁵” class. Mrs. Kinsey expressed that

Per2_Boys_front09.28.mp4: 35:45-37:12; or *Per2_Boys_back09.28.mp4*, 34:56-36:23

⁶³ Refer to comments from 10.11_SRT.mp4, 7:00-9:05, also cited elsewhere in this dissertation.

⁶⁴ Refer to comments from Mrs.K1_09.27.mp4, 41:50-43:50 and 10:05_SRT.mp4, 8:15-9:20, also cited elsewhere in this dissertation.

teaching a full classroom of boys might not be a wise decision (e.g., “What are they thinking!”) and the boys were seen as presenting greater behavioral concerns than the girls. Therefore, although the boys might have been developing skills that were valued in science, they might have been getting turned off from school in general. Conversely, the girls might believe they are better students, while they might be getting less exposure to some academically-valued skills.

Although the boys’ interest in school might be adversely affected by some of the ways they were treated, Mrs. Kinsey and some students expressed a belief that boys were more interested in science than girls. These perceptions could impact participants’ interpretations of classroom events and further reinforce notions regarding which sex, if either, is more inclined to pursue and succeed in science. The next chapter focuses on this topic of interest in science.

⁶⁵ Refer to comments from 10.25_Lunch.mp4, 8:50-9:25, also cited elsewhere in this dissertation.

CHAPTER 6: INTEREST IN SCIENCE

As seen in the last chapter, the all-boy and all-girl science classes did not experience identical science classes as they were sent different messages regarding the discourses that were valued in that discipline. Additionally, distinct identities for boys and girls were constructed regarding who they were as students, especially science students. Boys experienced more argumentation – which is often valued in science – but were treated as though they were behaviorally worse students who were reprimanded much more often than their female peers who were viewed as better behaved and possibly more educable. These differences could impact students' relationship with science, including their interest in the discipline.

This topic of interest in science, especially as it relates to gender, was raised during a conversation Mrs. Kinsey and I had regarding her background with gender differences in science education. She explained that she had been introduced to ideas about “gender differences” in science and science education during her pre-service coursework. According to her, the professors leading these courses discussed studies showing that, “girls typically score lower in science and in math than boys do, and that fields like engineering and things like that that are science- and math-related, tend to have very low numbers of women in them for jobs, and even just degrees” (Mrs.K6_11.02.07.mp4, 12:35-13:12). According to her professors, these outcomes arose because of girls’ “lack of interest” in science (Mrs.K6_11.02.07.mp4, 13:45-13:50). When asked why her professors, or she herself, thought girls were less interested in science, she replied, “They just said how they learn, or maybe how it’s taught to

them...But society's views are more boys should be playing with tinker toys, boys should be building Legos, boys should be doing scientific-type things...where girls should be playing with dolls" (Mrs.K6_11.02.07.mp4, 14:13-14:52). Mrs. Kinsey had been introduced to the view that boys were more likely to succeed academically in and obtain careers in science than girls due to societal factors that led boys to become more interested in science.

Although these comments suggested that many of these opinions were heard from her professors, Mrs. Kinsey explained a personal view that the single-gender courses could provide means to increase girls' interest in science. These comments were presented earlier in this dissertation, when she mentioned that although she had not been teaching her all-boy and all-girl classes differently, she believed single-gender science classrooms can allow girls,

to feel comfortable and to be excited about learning about science in a girls' way, whether we have to reach them in a different way to get them interested in it, whether or not we have to tie science into something that relates to just girls to make it more interesting and to make them get good grades in it, to help them wanna learn more about it and to go into science fields (Mrs.K6_11.02.mp4, 14:52-16:49)

This perspective implied a belief that girls were typically less interested in science, or at least in the way science has been traditionally taught, because something "different" had to be done in order to get them interested in it and increase their grades. It could be argued that relating academic content to individual or group interests could prove beneficial to students' educational experiences; however, Mrs. Kinsey's comments

suggested that there was a “girls’ way” to learn science and therefore a “boys’ way” to learn science, and this “boys’ way” might be seen as the way science was often taught. This endorsing of two “ways” to learn science implicitly grouped boys and girls into two homogenous groups and reinforced the notion that these groups were different. She gendered science education by strongly implying that different pedagogical approaches could be implemented for girls and boys in order to maximize their interest and performance in science.

Interest Among This Year’s Girls and Boys

Mrs. Kinsey’s Views

When asked if the girls and boys she taught this year were “equally interested in science,” she said that if the students were taught together, in coeducational classes, “I think that a good chunk of the girls woulda just sat back and let the boys do everything and just work on the answers...’Cause maybe [the girls] were less interested...[and] the boys are maybe a little more interested” (Mrs.K6_11.02.07.mp4, 18:12-20:32). She explained that both girls and boys placed equal amounts of “effort” into their science work, but that, “[The girls are] interested in what they’re doing because they want to get a good grade...[And the boys are interested in science] because they’re interested in it to tinker” (Mrs.K6_11.02.07.mp4, 20:32-20:50). These statements further supported the claim that the girls were viewed as the academically better students⁶⁶ in the sense that

⁶⁶ Readers could argue that prioritizing “tinker[ing]” over grades might label the boys as “better students,” but I have defined academically better students in agreement with how Mrs. Kinsey and Mrs. Frost used that phrase, and related ones. When these adults discussed their “best students,” they always referred to their grade book and mentioned those students who performed best in the class and when I initially asked Mrs. Kinsey for the names of students she would label as “high-performing,” “low-performing,” and

they were more concerned about academic success, whereas the boys were implicitly seen as worse students, although they were seen as having a greater interest in science.

The Students' Views

Although some students claimed that boys outperformed girls in science class, such as Tammy who said, “I think [boys]’re better at science” (10.19_Lunch.mp4, 6:15-11:25), many girls expressed an interest in science and claimed to enjoy it, such as Dana and Michelle who called science “fun” (10.04_SRT.mp4, 16:15-16:45). More support for the view that girls were interested in science came from the data generated when Mrs. Kinsey had her students, near the end of October, rank their classes from “most interesting” to “least interesting.” Results were generated for all 60 students who were part of the team at that time⁶⁷ and *Table 9* shows the number and percent of students of each sex who ranked science as their first, second, third, or fourth most interesting class, among their four core classes, and the average rank science class received among each class of students.

Although more girls ranked science as their least interesting class (6 girls, 21.4% of that class, compared with 1 boy, 3.1% of that class), and overall the boys ranked science as more interesting than the girls (an average ranking of 1.7 by the boys compared with 2.0 by the girls), science was the class both girls and boys liked most; half of the girls and almost 60% of the boys ranked science as their most interesting class. More than two-thirds of each class listed science as one of their two most interesting classes. Although this data cannot definitively answer if one set of students had more

“average,” in order to be certain that I interviewed students from these three groups, she often discussed her “high-performing students” as her “better students.”

interest in science than the other, these results indicate that a sizable number of girls and boys expressed an interest in science class, especially relative to their other classes.

Students' interest in science class, relative to their other core classes (1 = most interesting)									
	Girls (n = 28)					Boys (n = 32)			
	1	2	3	4		1	2	3	4
Number of students	14	5	3	6		19	5	7	1
Percent of students of that sex	50.0	17.9	10.7	21.4		59.4	15.6	21.9	3.1
Average rank	2.0					1.7			

Table 9: Number and percent of students of each sex who ranked science as their first, second, third, or fourth most interesting class, among their four core classes, and the average rank science class received among each class of students.

As suggested by the students' rankings and comments, both classes contained many students who were interested in science, yet Mrs. Kinsey believed the boys were more interested in the discipline. Although she believed societal factors impacted the interests students had developed, leading girls to be more likely to enjoy dolls and makeup while boys would be more likely to enjoy sports, Legos, and "scientific-type things," classroom behaviors and interactions might have strengthened Mrs. Kinsey's views about boys' and girls' interests. An examination of an analogous episode from the two classrooms can provide more information as to how her views might have been impacted through classroom events. Her views, including any changes to them, could ultimately impact how she interacted with students and their subsequent interest in science.

⁶⁷ By that date, two girls from the team were no longer members of the school.

Mass and Volume Activity

Shortly after students were to have signed and returned their “science safety contract,” in which they agreed to follow specific rules for appropriate behavior when performing science investigations, the classes discussed how to use triple beam balances and graduated cylinders and worked in groups to measure the mass and volume of specific items (a paper clip, marker, pen, and eraser [mass only⁶⁸]) that were provided to them. Below are excerpts of events that took place in each class as students began completing the required measurements. As with earlier vignettes, since the boys’ class met earlier in the day than the girls, I will present events from the boys’ class first.

In the all-boy class⁶⁹:

After one group is seen to finish measuring the required items, one boy takes out his wallet and places it on the triple beam balance. This group of boys determines its mass. Next, one of these boys places a quarter on the scale and this group determines its mass. Other boys in other groups begin measuring different items, when done making the initially required measurements.

With about 15 minutes of class remaining, Mrs. Kinsey starts talking to the whole class, but many students are not focusing on her. She says, “Put your heads down... This is the only way I can get you guys to listen, then that’s what I’m going to start doing... Once you’ve [completed what was required on the worksheet], you may then decide with a group that is next to you, on an item that

⁶⁸ Since the erasers would not fit inside the graduated cylinders, Mrs. Kinsey told students not to measure the volume of these objects.

you each have, like a wallet or maybe you want to do a pencil case, to see whose is, maybe whose weighs more, whose weighs less.”

Boys who had not completed measuring the required items continue working to complete this assignment. Other boys who have finished these tasks are seen placing various items, such as staplers and wallets, onto the scales. After one boy asks Mrs. Kinsey if he could measure the mass of his cell phone (cell phones were not to be used during the school day), and Mrs. Kinsey agreed, many boys begin taking out their phones, finding the mass of each one, and comparing which phones were most, and least, massive.

At one point, there are 12 boys crowded around three triple beam balances, using these tools to find the mass of things that were not required for the assignment. There is a buzz of activity and sound throughout the room as students are seen moving around, completing the lab, measuring additional items, and talking about a variety of topics, including their measurements.

With about five minutes remaining in the period, Mrs. Kinsey has all the boys sit in their seats and says, “We are going to take a look at our information...Raising your hand, what weighed the most out of all of your objects?” As several boys raise their hands, some of these students, as well as some who are not raising their hands, say “eraser.” Mrs. Kinsey asks how many students agree that the

⁶⁹ Video: *Per2_Boys_front09.27.mp4*: 23:00-48:40; or *Per2_Boys_back09.27.mp4*, 25:35-51:15

eraser “was the heaviest item” and then Jason is selected to state the mass his group found for the eraser. Mrs. Kinsey then asks the class how close that value is to what other groups found. After hearing some of these values, she says there is about a two gram difference among the masses that were stated. She asks, “How many of you think that they measured wrong and how many of you think that the different erasers could possibly be different amounts?” Several voices are heard claiming that the erasers were different, leading groups to get different values. Mrs. Kinsey agrees and then says, “How many of you think that if we all used the same eraser, we all would’ve got the same mass?” Several students say “no,” and Mitch is heard explaining that it would depend on whether the scales were “calibrated or not” by the different groups. Mrs. Kinsey agrees, responding that it “depends on how well you calibrated [the balances].” They then discuss the mass of other objects.

In the all-girl class⁷⁰:

After one group is seen to finish measuring the required items, one girl starts singing the alphabet and some of her partners sing too. This group of girls begins socializing with each other and engaging in activities, such as drawing on their notebooks and talking about events that took place outside of class, unrelated to the science tasks they just completed. Other girls in other groups start, or continue, social conversations with their peers when done making the initially required measurements.

⁷⁰ Video: Per4_Girls_front09.27.mp4: 32:15-50:45; or Per4_Girls_back09.27.mp4, 31:15-49:45

With about 15 minutes of class remaining, Mrs. Kinsey starts talking to the whole class, but many students are not focusing on her. She says, "Girls! Stop where you're at. Freeze for just a second...I'm going to give you the next five minutes...to finish what you're doing and to get your answers down...If you're done, clean up your area, all right, and get your stuff situated."

Girls who had not completed measuring the required items continue working to complete this assignment. Other girls who have finished these tasks are seen returning equipment to the back of the room and moving about the class, talking with other students about non-science topics. One girl is heard proclaiming, "We're done!" and her partner takes the triple beam balance to the back of the room, returns to her seat, and starts socializing with her classmates.

At one point, there are 17 girls crowded around three tables, socializing and engaging in behaviors unrelated to the science activity just completed. There is a buzz of activity and sound throughout the room as students are seen moving around, completing the lab, returning their equipment to the back table, and talking about a variety of topics, not much of which is about their measurements.

With about five minutes remaining in the period, Mrs. Kinsey has all the girls sit in their seats and says, "Girls, when you're doing the actual volume, I've seen too many of your papers that have the wrong answer. Actual volume is not what the

amount of water rose to. If you were at 50 and your amount of water rose to 52, you do not write down 52 milliliters. You write down two milliliters. You're writing down the space that that water rose. That space is what they call displacement. The amount of water, or space, that was displaced is what equals your actual volume. So again, what is my actual volume if I drop in this pencil into a graduated cylinder and I started at 50 and my graduated cylinder now reads 60. *(No hands are raised.)*...If my graduated cylinder, the milliliters of water was 50 milliliters and then I dropped this pencil in and now my graduated cylinder reads 60 milliliters. The volume is going to be the amount of space that that water rose. Also known as displacement. How much water was displaced if I went from 50 to 60? *(No hands are raised. One girl says, "It's ten.")* Ten. So what is my actual volume of this pencil? *(The same student's voice is heard saying, "Ten.")* Ten milliliters. Is that clear with everybody now?" *At least one girl is heard saying "Yes" and Mrs. Kinsey then asks specific girls if they understand this content.*

Many students in both classes completed the required measurements with more than 15 minutes remaining in the period and the above excerpts describe how many students behaved during this final portion of class. Their actions suggest some overall differences in classroom behavior and messages that developed in the two classes. The following discussion will focus on these happenings according to three topics, namely: "What students did when they finished the required measurements," "How Mrs. Kinsey

sought to obtain the students' attention," and "Whole-class discussion during the final five minutes of class."

Students' Behaviors After Obtaining the Required Measurements

After students in the two classes found the mass of the eraser as well as the mass and volume of the paper clip, marker, and pen, many of them engaged in different behaviors. The girls' class had several groups of students socializing about non-academic matters, whereas the boys' class had several groups of students measuring the mass of objects that were not required as part of the initial assignment. Although these differences might have arisen because the students had different levels of interest in this science and using these tools, that is neither something I feel I can confidently claim nor is it central to the following analyses. Instead, I will focus on what transpired during these lessons and how these events could impact students' interest in science, their science knowledge, and Mrs. Kinsey's perceptions regarding boys' and girls' interest in science.

The boys clearly got more experiences with the triple beam balance and were encouraged and allowed to use them to measure additional items, including things that might have personal meaning to them (e.g., their own cell phones). Some boys started taking these actions before Mrs. Kinsey stated that they should do these measurements and she ultimately told them to make comparisons among their measurements, to see "whose weighs more, whose weighs less." The skills of using balances to determine the mass of objects, and of using those values to make analytic comparisons to evaluate which values are more or less than other values, are useful skills that are valued in science (National Research Council, 1996).

Conversely, when girls started finishing their measurements with approximately the same amount of class time remaining, they were not seen to begin using the balances to measure other items. Although Mrs. Kinsey had taught the boys earlier in the morning and encouraged them to measure additional objects, at an analogous place in the lesson she told the girls, “If you’re done, clean up your area...and get your stuff situated.” Many girls did place their equipment in the proper place at the back of the room and used the subsequent minutes to talk socially with peers.

When Mrs. Kinsey reflected on this mass and volume activity, she noted her own observations of different behaviors taken by the girls and boys when they completed the required measurements for the worksheet. She said,

When [the boys] were done they started measuring all the other stuff. They were like, “Ooh, let's see what else we could measure! Let's see what this weighs!” The girls were like, “We're done, can we put it away?” They were done with it when they were done. They weren't interested in weighing anything else...When it was over, it was over. They weren't looking forward to trying to find anything else or to figure out how the scale works (Mrs.K1_09.27.mp4, 14:31-15:35).

Mrs. Kinsey apparently noticed this difference in the students’ actions and even suggested that the boys were more excited, and had more fun, using the balances (e.g., “Ooh, let’s see what else we could measure!”) and gained a greater understanding of “figur[ing] out how the scale works.” These observations might strengthen her view that the boys were “more interested” in science, especially since she said the girls, unlike the boys, “weren’t interested in weighing anything else.”

She placed all the credit for the students' behaviors on the students themselves, while removing herself from her recounting of the classroom events. As a result, she seemed to have interpreted their actions through conjecturing various comments or thoughts the students experienced without acknowledging that she *told* the boys to make additional measurements and comparisons. Although some of the boys started these actions before being instructed to do so, it is unclear how many of the boys would have participated in this additional "tinker[ing]" if Mrs. Kinsey had not told the boys to take these steps after they finished the worksheet⁷¹. As a result, Mrs. Kinsey might have actually furthered her own self-perception that boys were more interested in science and girls were less interested by telling boys to continue to use the science equipment while the girls were told to put their equipment away.

Regardless, the girls only used the triple beam balances to complete the requirements of the worksheet, and missed out on the excitement evident among the boys as they used the science tools to determine and compare the mass of different personal belongings. As a result, students' fondness for the science equipment, and possibly, by extension, science itself, might have been increased more among the boys than the girls. Also, the boys spent more time using these tools, which might increase their comfort with them.

⁷¹ These new directions, although stated aloud, seemed to be understood by students as an optional requirement for the assignment in that most students did not record the mass of these extra items nor wrote about any comparisons that were made. Additionally, several students did not make these extra measurements either because they were completing the original requirements on the worksheet or they chose to use their extra time in other ways.

Mrs. Kinsey's Actions to Obtain Students' Attention

Although the boys obtained additional exposure to the science tools and might have enhanced their interest in working with these items, they continued to receive stronger messages that they were misbehaving students who were difficult to control. When Mrs. Kinsey started talking to each class with about 15 minutes remaining in the period and viewed the students as not focusing on her, she stopped what she was saying and used tactics aimed to get them to concentrate on her comments. For the boys, she told them, "Put your heads down... This is the only way I can get you guys to listen" whereas with the girls she said, "Girls! Stop where you're at. Freeze for just a second." Both approaches reprimanded the students, but the girls were told simply to stop what they were doing, whereas the boys were essentially being told to stop what they were doing and place their heads down. Additionally, the boys were informed that such actions were the "only way" she could get them to listen.

In both instances, she sought to control the students' bodies (e.g., "heads down" or "freeze") but one approach was more disempowering and infantilizing. Having the boys place their heads down was a submissive act that led boys to cast their heads and eyes downward, often into their arms, as they did what was ordered. As a result, the boys were not looking into Mrs. Kinsey's eyes nor was Mrs. Kinsey seeking to look at the eyes, or even the faces, of the students. This act served to reinforce (or clarify) the power differential that existed between teacher and students in this room. Also, by implementing a management strategy that she had found effective in the third grade classroom where

she had completed her student teaching, Mrs. Kinsey infantilized the boys by treating them like third graders⁷².

Her comments suggested that the boys were more difficult to control as she needed them to place their heads on their desks as the only means to get them to stop their other actions and (presumably) focus on her. As previously quoted, Mrs. Kinsey claimed that both the girls and boys needed direction concerning her expectations of them, but the students responded to these directions differently such that she needed to treat them differently. “[Girls] need direction, but when you go to give it, they’re ready to listen...The boys...you can say it fifteen thousand times and then you have to say ‘Put your heads down’” (Mrs.K1_09.27.mp4, 1:00:50-1:02:05). Her actions during this mass and volume activity reinforced her view that boys needed more direction, in order to act appropriately behaviorally and academically. But were these perceptions justified in this lesson?

Maintaining constructed identities

Mrs. Kinsey noticed that the boys took initiative in moving forward with the experiment, whereas the girls did not, and told me, “when [the boys] didn’t have their stuff they got up and went and got it. The girls were like, ‘We don’t have this. We don’t have this.’ It’s like, ‘Then get up and go take what you need’” (Mrs.K1_09.27.mp4, 15:35-15:52). Regardless of these comments suggesting that the girls needed more instruction in what to do and how to move forward, she remained committed to the view that,

⁷² She told me that she used this strategy because, “It just quiets ’em down...In my cooperating room, the teacher used that a lot, too...I don’t think [students] like it” (Mrs.K4_10.26.07.mp4, 3:00-3:50).

[Boys] need redirection and, although the science experiment didn't show that today, they need to be told what to do, when to do it, how to do it. Girls, if you give them just a little bit of instruction, they'll get the necessities, typically. Again, I don't think it happened today [in the mass and volume activity] and maybe it was just because they weren't interested in the activity that took place.

(Mrs.K1_09.27.mp4, 46:05- 50:45)

Mrs. Kinsey was a new teacher, and that day was the first lab activity of the year where students used science equipment from the room, but her comments suggested some perceptions she had developed regarding how girls and boys "typically" behaved. These perceptions were that boys needed more instruction being "told what to do, when to do it, [and] how to do it," whereas the girls could make headway if given, "just a little bit of instruction." These perceptions were not reinforced through students' behaviors in this activity, as evidenced through Mrs. Kinsey's comment that "the science experiment didn't show that [to be true] today," yet she seemed to maintain her views by attributing these anomalous behaviors to another view she voiced regarding boys, girls, and their interest in science.

She reasoned that this outcome possibly arose because the girls "weren't interested in the activity," seemingly in agreement with her view that girls were less interested in science. By finding means to account for observations that contradicted her perceptions, she was able to maintain her initial views regarding which sex of students was more interested in science, behaved most appropriately, and needed more redirection in order to adhere to her expectations for desired academic and non-academic behavior. This reasoning, like her actions discussed earlier (i.e., telling boys, but not girls, to make

additional measurements and comparisons), aided her in maintaining constructions for boys and girls that led them to be identified relative to each other.

Whole-Class Discussion During the Final Five Minutes of Class

As with the excerpts from the lesson introducing students to the five characteristics of living things, the whole-class discussions noted in these portions of this mass and volume activity differed between the two classes. The conversation in the girls' class was more of a teacher-led lecture, whereas the discussion in the boys' class contained more students' voices, partially because she asked them more questions. As a result, the boys had a more active role in the discussion that took place in their science lesson. Mrs. Kinsey asked the boys to evaluate the varied measurements and to state whether they believed the differences among the values were due to groups making incorrect measurements or if they had different erasers. Although she did not ask them to defend their claims, or supply reasons for any of their responses, Mitch supplied his own reason why the groups might not get the same value (i.e., the values would depend on whether or not all the groups calibrated their scales similarly), even if they all used identical erasers. Mrs. Kinsey validated this response, thereby again supporting the defending of claims in the boys' class.

Additionally, the focus of, and reasons for, the dialogues that developed in the classes were different. The discussion in the boys' class had them analyze their recorded measurements, other groups' measurements, and the methods employed in the activity, whereas the discussion in the girls' class reviewed a measurement many of them had seemingly struggled to record correctly. Although it is important that the girls be able to

measure “actual volume” appropriately, Mrs. Kinsey acknowledged to me that, “A lot of [boys and girls] were writing down for ‘actual volume’ the volume that [the water] went up to, not the actual volume of the object” (Mrs.K1_09.27.mp4, 12:20-14:00). She said that the boys, “were able to do [the lab] easily...except for the ‘actual volume,’” yet she used the final five minutes of class to discuss this calculation with the girls, and not the boys.

It is not entirely clear why this conversation only took place with the girls, especially given Mrs. Kinsey’s admission that both classes struggled with this concept, but it could partially be explained by her view that the girls were more interested in getting good grades, while the boys were more interested in science (Mrs.K6_11.02.07.mp4, 20:32-20:50). When starting this discussion with the girls, she noted that many of them had the “wrong answer[s]” on their papers, and the ensuing conversation was meant, at least in part, to assist them in correcting these values. She seemed to want to assist them in recording “right answers” and her comment might have been thought to motivate the girls, at least implicitly, since she stated that their interests resided in “get[ting] a good grade (Mrs.K6_11.02.07.mp4, 20:32-20:50). Conversely, the discussion in the boys’ class neither focused on any questions that were asked on their worksheet nor verified that they had correct calculations so as to maximize their grade on this activity. Instead, the conversation in the boys’ class had them focus more on their data and on the act of measuring objects, or the actual “tinker[ing],” involved when engaged in science. Therefore, Mrs. Kinsey’s behaviors with these two classes did not challenge her notions regarding boys’ and girls’ interests in science, but might have reinforced her constructions that boys were more interested in science itself and the

methods involved in this discipline, while girls were more interested in obtaining good grades.

Conclusion

During this mass and volume activity, the boys got more experience with science equipment and the discursive, analytic tools involved in analyzing their data and methods. These experiences might increase the likelihood that the boys will be able to successfully work with and employ these tools and equipment in the future and could enhance their interest in science. Mrs. Kinsey's interpretations of these students' behaviors enabled her to maintain her view that the boys were more interested in science, but were the more poorly-behaved class that required more authoritarian classroom management in order to get them to behave as she wished. Conversely, the girls were treated as though they were better-behaved students (i.e., easier to control) who were less interested in science and more interested in grades. They were not pushed to engage with the science equipment or tools to the same extent as the boys, therefore possibly communicating additional messages that science is more appropriate for boys. Although the girls and boys performed roughly similarly in this science class, and a large number of both girls and boys ranked science class as one of their most interesting classes, events like those seen in the mass and volume activity, coupled with Mrs. Kinsey's interpretation of the girls' and boys' relative level of interest in science, could help lead to the outcome whereby boys outperform girls in science and express more interest in science.

CHAPTER 7: VARIABILITY WITHIN-CLASS AND WITHIN-SEX

The analyses presented in the last two chapters highlighted some of the differences experienced in the two classes and messages that might have been communicated regarding science, gender, and the intersection between these two constructs. The rhetoric of gender differences often discusses boys and girls as uniform groups and the analyses thus far could be read as treading close to doing the same. However, many students of the “opposite” sex behaved similarly to each other, oftentimes in ways that contradicted statements made regarding boys’ or girls’ behaviors and interests. Such observations support a “gender similarities” argument more than a “gender differences” perspective (Hyde, 2005).

For example, these chapters claimed that boys were more interested in science while girls were less interested in science. But looking back at *Table 9*, one-quarter of the boys ranked science as their least interesting, or second-to-least interesting, core class while half of the girls ranked science as their most interesting core class. Additionally, boys, and their class, were constructed as being poorly behaved while girls, and their class, were constructed as being better behaved. However, some boys regularly adhered to the (implicitly-defined) classroom rules in that they were rarely reprimanded while a number of girls were repeatedly told to stop certain behaviors. The excerpts from the lesson on the five characteristics of living things contain instances of both of these occurrences (see Chapter 5 for the entire excerpts and analyses). In these excerpts, Mrs. Kinsey asked both boys and girls to raise their hands before providing answers and while many boys did as they were told, raising their hands and waiting to supply answers until

Mrs. Kinsey said their names, Dana, Abby, and other students in the girls' class supplied answers aloud without raising their hands or being selected to contribute. These behaviors led Dana to be told that she was "disrupting" class and to be scolded and told, "don't talk." Overall, the analyses in those chapters discussed what many students did during lessons and the cultures that were developed for the two classes, but there were a number of students who behaved in ways that countered the identity that had been developing for their class and members of their sex.

This chapter primarily focuses on students' engagement in lab work and their willingness to interact with science materials to highlight the within-sex variability evident in both classes and show ways in which members of each sex contradicted identities for that sex of students. Before moving into those excerpts, I want to spend more time revisiting the topic of boys' and girls' interest in science to highlight how Mrs. Kinsey, like other participants, sometimes implicitly supported within-sex variability and other times suggested that each sex was a homogenous group.

Interest in Science, Revisited

The previous chapter noted that Mrs. Kinsey suggested that boys were more interested in science than girls; however, during a conversation regarding the single-gender program at P.D. James Middle School, she noted that neither all boys, nor all girls, were the same. She said,

Am I going to take one of those girls that absolutely thinks, "Oh, science, math,...I'm no good at it," or that's gonna get pushed down because they're in a classroom full of boys and never attempt to do anything and just kind of sit in the background and turn 'em into a science-lover or a math-lover and open up new doors of interest to them?...That's a perfect

reason to have these [single-gender] classes. But at the same time, you've got boys in the class that are still...that might still be that background person, and just because they're in an all-boys class, you can't expect an all-boys class to love science just because they're boys. That's being naïve. You still have to find some way to pique the interest of those boys in there that still might not like science. Or same thing for the girls. Not every girl's gonna like language arts...So you've got to be careful. You can't just assume because they're in single-gender classes and it's stereotypical that girls like language arts and boys like science and math, that you just assume they're gonna be interested in it. Because there's always gonna be one or two that still are not interested in it...And I think that by just doing single-gender classes, you're just assuming that, that okay well, these are gonna learn this way, these guys are gonna learn this way...It goes back to the individual students. You still have to pay attention to every student and understand that they all have individual interests.

--Mrs. Kinsey (Mrs.K6_11.02.07.mp4, 33:43-35:38)

Mrs. Kinsey was discussing one potential benefit to single-gender classes, namely that they may provide opportunities to teach the content differently to boys and girls that would increase their grades and interest in science. But she was concerned that such a perspective might lead people to believe that all students of a given sex would learn a certain way (e.g., "these are gonna learn this way, these guys are gonna learn this way") without looking at differences among individual students to see how to align approaches to the particular needs and interests of specific students. She expressed concern that these classes might reinforce stereotypes for each sex, and cautioned, "You can't just assume because they're in single-gender classes and it's stereotypical that girls like language arts and boys like science and math, that you just assume they're gonna be interested in it." She acknowledged the existence of within-sex variability and the need to examine these differences within the single-gender classes.

Mrs. Kinsey suggested that teachers should be careful about the assumptions they bring to single-gender classrooms. Although she noted that not all boys would be

interested in science and that all students of a given sex might not learn a given “way,” other comments she made suggested that she endorsed sex-based stereotypes about teaching science as a means to possibly increase girls’ or boys’ interest in science. She explained that teachers might need to “tie science into something that relates to just girls to make it more interesting [to them] and to make them get good grades in it” and provided one example of having the girls explore mass and volume through the use of makeup compacts (while boys could use footballs or something else related to sports) (Mrs.K6_11.02.mp4, 14:52-16:49). The view that makeup compacts applied to “just girls,” and implicitly to all girls, or that footballs were something just boys, or all boys, could relate to and would find interesting, endorsed the perspective that girls and boys were homogenous groups with distinguishable interests. These comments differed from others she made that acknowledged that some girls or boys might not share the same interests as many of their same-sex peers.

These comments reinforce the claim that discussions and analyses of gender are complex. People might construct and employ varied lenses at different times. During interviews and other conversations, participants seesawed between discussing the girls and boys as distinguishable groups with unique characteristics, and as groups that contained individuals who exhibited variability among multiple dimensions. The previous sections primarily focused on co-constructed messages suggesting that boys and girls were distinct groups with between-sex differences. Conversely, this chapter primarily focuses on the within-sex variability among boys and girls by exploring some classroom observations centered around their lab work and their willingness to interact with science materials.

Lab work was selected as an area in which to explore within-sex variability because this activity is central to many science classes and careers. It requires students to interact both with peers and science materials and although being able to effectively and comfortably work with lab partners and science materials can impact students' interest and performance in science, other authors have reported that boys dominate group work, often relegating girls to more silent, less active roles (AAUW, 1992; Lee, Marks, & Byrd, 1994; Sadker & Sadker, 1994).

Cooperative and Collaborative Learning

When defining "science education," Mrs. Kinsey said, "It's about cooperative learning...In order to experiment things and to do investigations you need multiple people so that you have different viewpoints going in when you're testing things, and that your view isn't skewed whenever you're doing an investigation" (Mrs.K2a_10.17.07.mp4, 24:18-25:20). She seemed to endorse the idea that working in groups was an important aspect of science education, and although no interview questions directly asked participants about how boys and girls worked together in science groups, Mrs. Kinsey and several of the female students mentioned that boys had taken over experiments in the past or might do so if they were taught in coeducational science classrooms.

Nancy commented that this year's science class would differ if boys were present because, "Boys would take over [experiments]." Haylee, who participated in this interview as well, agreed with Nancy and said, "[Boys] would want to do the experiment and kind of push the girls aside." Both Nancy and Haylee explained that these situations

have occurred before and when they did arise, Nancy said, “We just stand there and we just let [the boys] do it.” Haylee agreed, saying, “We just stand and watch them do it” (10.29_SRT.mp4, 10:20-12:30). When the boys took over the experiments, they said science class became less enjoyable, but they seemed resigned to these realities, explaining that even when teachers tried to stop boys from taking these steps the boys just made sure to take over when teachers were not looking (10.30_Lunch.mp4, 10:10-11:05).

Mallorie and Anna also commented on these occurrences. Although Mallorie stated that the worst thing about having boys in her science class would be that “They take over a lot of stuff” (10.08_Lunch.mp4, 22:45-22:55), she claimed that she sometimes enjoyed when boys took control of the experiments because, “Sometimes it’s funner to watch the boys in science experiments cause they just sit there and play with the stuff, like it’s no big deal, and the girls, like, are all scared to touch it” (10.08_Lunch.mp4, 12:00-14:35). Although she occasionally found these occurrences “funner,” she sometimes wanted to be the one to “dissect something” or have a more active role in the experiments and said that, overall, boys taking over experiments would be the worst aspect of having boys in her science class. Anna agreed that boys tended to, “take over the project” in science class and that that was the worst thing about being in a coed science classroom. Both girls said they had no idea why boys behaved this way and that they were unable to stop the boys from taking these actions (10.08_Lunch.mp4, 20:10-21:20).

Mrs. Kinsey also expressed her views that boys might take over experiments from girls if students were in science class together. She partially attributed this outcome to

boys having a greater interest in the subject matter. In the previous chapter's discussion surrounding boys' and girls' interest in science, Mrs. Kinsey was quoted as saying that if the science classes were coeducational, "a good chunk of the girls woulda just sat back and let the boys do everything... 'Cause maybe [the girls] were less interested...[and] the boys are maybe a little more interested" (Mrs.K6_11.02.07.mp4, 18:12-20:32). The phrase, "a good chunk of the girls," suggested that she believed some girls in a coed class would not have "sat back and let the boys do everything," but she still believed a number of girls would behave in this manner. In her view, having the boys and girls together in science class "wouldn't have forced [the girls] to get the work done" because the boys would be more interested in the content and would do the required work while the girls would "just work on the answers" (Mrs.K6_11.02.07.mp4, 18:12-20:32). These statements reinforce the claim that Mrs. Kinsey viewed the boys, at least at times, as being more interested in the science tasks whereas the girls were more willing to focus on "answers" (i.e., their grades) and would need to be "forced," by the absence of the boys and the prospect of receiving low grades, to do the science activity.

Given the comments raised by Mrs. Kinsey and several students, these participants seemed to believe that the single-gender classes would benefit girls' experiences with science experiments. Their statements suggested a view that the girls would work more collaboratively and be more actively engaged during lab work in single-gender classes because those students who took over experiments, namely boys, would be absent from the room. This perspective implied that girls themselves would not "take over" lab work and attributed boys' taking over behavior as something beyond the influence of the teachers or female students. It suggested that this outcome was entirely

the boys' doing, but yet Haylee admitted that girls did not do much to stop it and "just stand and watch [the boys] do it" while Mrs. Kinsey herself omitted mention of the teacher's role in her assessment of how students behave in different settings. Instead of trying to impact the boys' behaviors through altering the girls' or teachers' behaviors, the discussed solution involved simply removing boys from the setting.

Such a solution reinforces the notion that the boys are not "good" students who work cooperatively with peers. Instead, they are positioned as disruptive to girls' learning, and the girls need to be "protected" academically from boys' aggressive classroom behaviors (possibly in addition to being "protected" from boys' sexual behaviors as noted in Chapter 4). Removing the boys from the room does not address the behaviors themselves and strengthens the idea that boys' and girls' behavioral differences are part of who they are, unable to be influenced by teachers, peers, or other external factors (e.g., "boys will be boys"). By not discussing how single-gender lab groups would affect boys' academic experiences, but instead noting that boys' behaviors adversely affected girls' academic experiences, Mrs. Kinsey and these girls were discussing the boys in behavioral terms while discussing the girls academically. As a result, the girls might be further positioned as more academically-minded and educable students relative to the boys.

Taking Over Experiments

What did Mrs. Kinsey and the girls mean when they discussed boys taking over science experiments? Their comments neither clearly nor explicitly explained what was involved in boys' "taking over" of experiments. Haylee might have hinted at something

when she commented that the boys, “kind of push the girls aside” as this “pushing aside” could involve subtle behaviors such as not positioning the equipment in ways that all group members could see it or more overt behaviors such as doing all the measurements alone (or only with fellow boys) or physically blocking other group members from participating. The interpretation I am most comfortable making is that by “taking over” experiments, these participants meant that the boys were the main ones completing the tasks and the girls had minimal roles in completing these activities.

By discussing how boys “take over” experiments, Mrs. Kinsey and these girls gave the boys greater agency than they attributed to themselves, implicitly positioning themselves as more passive bystanders, helpless to change these outcomes in coed environments. Their comments seemed to center boys and boys’ behaviors as the foci of their analyses without giving comparable weight to the girls and teacher(s), both of whom played important roles in these happenings. The teacher’s structuring of lab work – such as telling students expectations for how they are to work together – could impact students’ behaviors. Additionally, the girls’ actions, even if they were viewed as passive, can affect the boys in these situations. Mrs. Kinsey said the girls “woulda just sat back,” Mallorie noted that she enjoyed “watch[ing] the boys in science experiments,” and Haylee stated that “[girls] just stand and watch [boys] do [the experiments].” Therefore, these “taking over” outcomes should be acknowledged as co-constructed outcomes involving the interaction among boys’ (undefined) taking over of the experiments, girls’ decision to sit back, watch, and not take over or engage with the activity, and the teacher’s behaviors in facilitating this work.

But were boys the only ones who took over experiments? Would girls sit back and watch other girls in their group do the lab work? Were there instances when boys collaborated with their peers in lab settings? Finding counterexamples that disprove some of the generalizations made regarding girls' and boys' behaviors would weaken the essentialist perspective that boys behaved one way and girls behaved another way. The implication that boys took over lab experiments while girls did not, and that all-girl groups would not experience any of this "taking over," can be explored through investigating events during one classroom activity itself. I will revisit the mass and volume activity discussed in the last chapter to investigate whether or not the single-sex groups behaved in ways the participants' comments suggested they would.

Mass and Volume Activity, Revisited

After students finished working with the triple-beam balances and graduated cylinders to find the mass and volume of various objects, Mrs. Kinsey spoke with me about her concern that if the boys and girls had been told to complete this assignment together,

would the boys have just took over for those girls that didn't know what they were doing and then the girls wouldn't have learned how to do it?...Because the boys know how to do it, were interested in it, would they have just hogged up the stuff and the girls would've just sat back and said, "Oh, let the guy do it. He knows what he's doing."...And then the girls wouldn't have learned anything because they didn't want to take the initiative. [The single-gender classroom] kinda forced them to take it. So I think that in science and math maybe that's one

of the aspects where having the separate classes allows them that, “Look, you have to be accountable for what you’re doing and figure it out amongst yourselves.”... You can’t rely on the man to do the stereotypical fixing, weighing.
(Mrs.K1_09.27.mp4, 1:25:10-1:26:00)

Mrs. Kinsey acknowledged that having men “weigh” things is a stereotype, but did not seem to acknowledge that she also endorsed other stereotypes when she stated that the boys were more “interested” in finding the mass and volume of objects and girls needed to be “forced” to do these measurements. Although she seemed to first mention a specific subset of girls (i.e., “those girls that didn’t know what they were doing”), she proceeded to discuss each sex of students as a uniform block when she said “the girls wouldn’t have learned anything” and “the boys know how to do it.” She was concerned that the boys’ greater understanding of what they were asked to do, as well as their greater interest in these tasks, might have led them to take over the experiments in mixed-gender groups. Therefore, she believed that the single-gender setting was beneficial because girls would have more opportunities to engage with the science materials.

Upon reviewing the videotapes and field notes concerning this activity, it is true that there were instances where one or more boys did the majority of the work for the group, seemingly “taking over” the experiment from other boys. Additionally, there were times when a group of girls worked collaboratively. But as the following excerpts will show, there were instances when the boys worked collaboratively and individual girls took over the experiment for their all-girl group. Whether or not these behaviors correlated more with members of one sex than the other is not the major focal point of this analysis. Instead, the data is useful for supporting the claim that there was within-sex

variability and many of the behaviors typically attributed to girls or boys could be exhibited by students of any sex and might be influenced by other factors in addition to, or instead of, the student's sex⁷³.

Boys who collaborated

The following excerpt begins shortly after Mrs. Kinsey finished talking to the class about how to use the graduated cylinder to measure the volume of objects. As groups returned to their work, a camera focused on one group of boys.

Lab group containing Tim, Keith, and David⁷⁴:

Tim, Keith, and David comprise one lab group and they are using the graduated cylinder to make volume measurements. They finished finding the volume of a marker and Keith is using tweezers to retrieve the marker from the cylinder. Tim and David lean forward to watch, and smile as the marker keeps slipping from the tweezer's grasp. Tim has draped part of his body across the table such that his face is inches from the cylinder. David gets out of his chair and stands up, enabling him to get a better view of Keith's attempts as Keith moves the cylinder from the tabletop and tilts it at an angle as he continues with his task of retrieving the marker. After several attempts, Keith successfully brings some of the marker above the lip of the graduated cylinder and says, "Oh there it is. Grab it, grab it, grab it!" Tim grabs it, raises his hands victoriously, and says "Oh! Oh!" After they record their volume measurement for the marker, they borrow a pen that they are to place in the graduated cylinder. All three students are fixated on the cylinder as Keith drops the pen in it. They lean forward, trying to read the graduated cylinder, and are heard saying:

Keith: It is –

David: It's like, all the way (*Looks intently at the graduated cylinder.*).

Keith: I think it's like – (*Has part of one hand wrapped around the cylinder and moves it up along the cylinder as he seems to be counting something*) –

Tim: Move your hand.

Keith: (*Unwraps his hand and continues counting along the side of the cylinder, lightly touching it with one finger.*) Its volume – (*pauses*)

⁷³ For example, students' behaviors could be affected by the particular peers in a given lab group, the teacher's facilitating of the activity, the grading rubric for the work, and the instructions for completing the tasks.

⁷⁴ Video: *Per2_Boys_back09.27.mp4*: 10:45-12:15

Tim: (*With his face right beside the graduated cylinder*) Fifty. (*Places the tip of his pencil along the cylinder and starts counting hash marks.*) One, two, three, four, –

David: (*His eyes have remained fixed on the cylinder during this exchange and he now leans his head closer to the cylinder and looks to be counting hash marks along its side.*)

Keith: Probably, fifty –

Tim: Fifty-five.

Keith: Fifty-five? (*Looks at the graduated cylinder and then looks at his worksheet.*)

David: Yeah. (*Seems to be done counting hash marks and sits upright, recording the measurement on his worksheet.*)

Keith: (*Records the measurement on his worksheet.*) I was a little close.

Tim: (*Picks up the tweezers and then the graduated cylinder. Dips the tweezers into the cylinder in an attempt to retrieve the pen.*)

The excerpt shows Tim, Keith, and David working together on this science activity. Overall, they seemed to work collaboratively and cooperatively. Each boy is involved in the work, contributing to the group's objectives. No member of the group appeared totally inactive, waiting for "answers" to be stated so he could simply record them on his worksheet. Additionally, no boy pushed the other boys aside, like Haylee said boys did to girls in group work (10.29_SRT.mp4, 10:20-12:30). Although the students might be seen as exhibiting different degrees of engagement or activity during this vignette, no student "took over" the entire assignment, such that he did it by himself while other students did not, or could not, participate.

At the start of the excerpt, the graduated cylinder was seen in Keith's hand and remained in front of him when the pen was submerged in it. But he did not do all the work. He used the tweezers at the beginning of the excerpt to retrieve the marker, whereas Tim was the first to use them later, to try and remove the pen from the water. When retrieving the marker from the cylinder, Keith actively sought assistance from

others in his group to “grab it.” These behaviors clearly suggest that none of these boys tried to do the entirety of the lab on his own.

The boys’ body language also suggested they were all involved in the activity and none of them was taking it over from his peers. Keith held the graduated cylinder, Tim placed his pencil along it, and David moved towards it, while none of them tried to pull it toward himself or away from others. Similarly, no boy seemed to purposefully keep group members from reading the cylinder and Keith was seen to readily remove his hand from the graduated cylinder after Tim told him to move it.

Additionally, the boys collaborated during their brief exchange regarding the volume measurements each boy seemed to determine on his own. Although they worked independently in reading the graduated cylinder, Keith began to say his measurement aloud before Tim stated his answer of “fifty-five.” Keith briefly questioned this value, but after looking at the cylinder and hearing David confirm the value by saying “yeah,” he seemed to be comfortable with the value and recorded a response on his worksheet.

This group of boys was seen to work together, without anyone fully taking over the experiment or blocking others from participating. Although some students might have seemed more active than others, they each participated and contributed to the group’s work, even if it were through small comments of “yeah.” This excerpt strengthens the claim that boys can be collaborative during group work and suggests that the statements regarding boys taking over experiments might not be a general “boy” trait. Instead, these behaviors could be isolated to specific boys, or possibly to specific students – some of whom are boys – in specific instances. Were there instances where girls were seen “taking over” experiments?

Girls who “take over”

I did observe instances where girls in the all-girl class seemed to work collaboratively, much like Tim, Keith, and David. But there were also instances where girls did not exhibit these collaborative interactions. One excerpt from this mass and volume activity can highlight such an occurrence and serve as a counterexample to disprove the implication made by Mrs. Kinsey and several students that removing boys from science class would “force” all the girls to do the science work since no one would be there to take over experiments.

Partway through this mass and volume activity, Kaci and members of her group asked me how to read their triple beam balance⁷⁵. After having placed an object on the pan, they moved the riders so their scale was balanced but were unsure how to determine the object’s mass based on this information. A few minutes after assisting them, I noticed Kaci leaning across a table towards Tammy, a member of a lab group sitting beside them, and handling some of the riders on this other group’s triple beam balance. These two girls seemed to be talking about the balance and I moved towards Tammy’s group to see what they were doing.

Lab group containing Tammy, Nancy, and Haylee⁷⁶:

Tammy is part of a lab group with Nancy and Haylee. Their balance faces Tammy, while Nancy sits behind the balance and Haylee sits off to the side. Nancy and Haylee seem unable to see the front of the balance or read the hash marks from where they sit, but they do not make any motion to change their positioning (or the positioning of the balance). The pan currently holds a marker. When I am close enough that the camera picks up the exchange between Kaci and

⁷⁵ Beginning around 19:45 in *Per4_Girls_back09.27.mp4*

⁷⁶ Video: *Per4_Girls_back09.27.mp4*: 24:30-26:10

Tammy, I see Kaci fiddling with the triple beam balance, talking with Tammy who seems to have asked some question(s) about how to use the balance:

Kaci: – (*Tammy just moved the middle rider to the “twenty gram” location.*) Now that’s too heavy. So it’s got to be between ten and twenty. So now you move that one (*pointing to the rider used for fine tuning measurements*)

Tammy: (*Tammy moves this rider along the track.*)

Kaci: And then you see until it zeros out (*shows where the pointer should be directed when it is “zeroed out.”*)

Tammy: (*Continues to move this rider.*)

Kaci: (*Sits back down in her seat, with her group.*)

During this exchange, neither Nancy nor Haylee leaned towards the triple beam balance, Tammy, or Kaci. They remained seated and quiet the entire time. It seemed as though they were only able to see the back and side of the scale from where they were seated. After Kaci returned to her seat, Tammy continues moving the riders until the pointer stops at the zero point.

Tammy: Perfect.

Nancy: Sweet. Now what is it?

Tammy: (*Looks more intensely at the riders.*)

Nancy: Like, fifty or something?

Tammy: Yeah. (*Looks at me*) Wouldn’t it be? How would you?

Howard: (*I walk around to the other side of the balance so I can see what she’s looking at. She points at some of the riders.*)

Tammy: That’s at ten and that’s at – ?

Howard: (*Pointing to different riders and parts of the balance*) So it’s ten. It’s more than ten. That would be eleven. It’s between eleven and twelve. It’s eleven point what?

Tammy: Point six.

Howard: Eleven-point-six. Yup. Do you understand how you read that?

Tammy: Yeah.

Howard: Perfect.

Nancy and Haylee: (*Still sitting in their seats, away from the balance, they record this measurement on their worksheets.*)

During the above excerpt, Tammy collaborated with some members of the classroom. She did not work entirely alone or unaided as she spoke with Kaci about how to use the triple beam balance and talked with me about how to read the measurement from this scale⁷⁷; however, she could be viewed as “tak[ing] over the project” in that she

⁷⁷ Students in both the all-girl and all-boy class asked me for assistance and these behaviors were not isolated to one class nor did one class seem to exhibit these behaviors more than the other one.

completed the tasks for her group while the other members of her group, Haylee and Nancy, did not participate in obtaining measurements. The behaviors of these three participants led to the co-constructed outcome where Tammy could be labeled as “taking over” the experiment for her lab group. Tammy did not ask her group members for assistance nor did she engage them in the conversations she had with Kaci and me. These observations are not a targeted criticism of Tammy, as it was evident that neither Kaci nor I made much effort to engage Haylee and Nancy when we spoke with Tammy. Additionally, Haylee and Nancy made no noticeable efforts to participate in these conversations or use the balance.

Tammy, Haylee, and Nancy’s body language also suggested that one girl had taken over the experiment. Tammy had the triple beam balance positioned immediately in front of her and made no effort to turn it so her partners could look at the front of the scale. Likewise, neither Nancy nor Haylee made efforts to lean forward and look at the scale nor did they seek to alter how the scale was positioned. Instead, Nancy was heard asking “what is [the mass of the marker]?” and both she and Haylee recorded the value Tammy stated without verifying this reading themselves. In fact, Nancy had earlier stated “fifty or something” as the measurement without looking at the balance even though Kaci’s earlier comment stated that twenty grams was too heavy and the mass had “got to be between ten and twenty.”⁷⁸

From these observations, it is unclear what would have transpired had Nancy or Haylee asked Tammy to turn the balance to the side so they could see it, or if they had

⁷⁸ I am unsure how or why Nancy stated a guess of “fifty or something,” and more insight into that occurrence could be provided if the camera had focused on this group earlier in the period. One conjecture is that other groups might have stated mass or volume measurements for different objects as being near “fifty,” and that might have influenced what Nancy expected to hear for the mass of the marker.

leaned towards it to make their own readings from the scale. Perhaps the term “take over” might seem more appropriate in instances where a student seized supplies or actively blocked others’ involvement in the work, but Tammy’s actions do involve her taking over the experiment for her lab group and completing all the work. Mrs. Kinsey had said that if the science classes were coeducational, “a good chunk of the girls woulda just sat back and let the boys do everything and just work on the answers...it wouldn’t have forced [the girls] to get the work done” (Mrs.K6_11.02.07.mp4, 18:12-20:32); however, this excerpt shows a group in which two girls “sat back” and seemed to “just work on the answers” and let another girl “do everything.” Mrs. Kinsey’s comments associated these behaviors with the students’ sex, but might this outcome have more to do with other characteristics of individual students than their sex? This example involving one girl who did the vast majority of the tasks in a group science activity, while her two female partners sat back and let her work with the equipment, suggests that it might be erroneous to generalize these behaviors to boys and girls respectively. Additionally, it lends support to the view that “taking over” is not the result of a select student’s (or students’) behaviors, but is a result that is negotiated among multiple members of a group.

Maintaining constructed identities

Although it might be possible that more boys took over experiments than girls, or more girls worked collaboratively, these behaviors were not isolated to members of one sex and the behaviors might have little, or nothing, to do with the students’ sex. Instead, they likely result from a variety of factors including the relationship among peers in a given lab group and the specific individuals in that group (e.g., Tammy might strive to

“take over” even in coed settings whereas Tim, Keith, or David might seek to collaborate with many peers regardless of if they are male or female).

Nevertheless, Mrs. Kinsey and several girls said that boys would take over, or have taken over, experiments in coed classes. Since I did not observe these students in coeducational science classrooms, I was unable to see instances where the boys and girls worked together on lab activities in order to support (or counter) these participants’ comments with my own observations. The absence of these observations does not lessen the importance of the participants’ perceptions that these happenings occurred, but how much of these memories and interpretations were products of their own biases? For example, when talking with Mrs. Kinsey about students’ behaviors during the mass and volume activity, she commented that some girls seemed uninterested in this activity. But when asked if she thought any of the boys were uninterested it, she said, “A couple of them, but I don't think they were disinterested, I think they were just talking...I don't know if they were necessarily not interested, or just off task” (Mrs.K1_09.27.mp4, 14:00-14:31). Mrs. Kinsey had not spoken with students about their interest in this activity and could only make claims about their interest levels based on her perceptions. Although she saw students of both sexes socializing during the activity, girls who spoke during the activity were labeled as being uninterested (or “disinterested”) in the science work, whereas boys who spoke during the activity were said to be “off task” but not necessarily uninterested in the science. As a result, she was able to interpret similar behaviors differently in a way that maintained her initial perceptions about boys’ and girls’ interest levels in science.

Girls Do Not Like “Nasty Stuff”

Although no boy mentioned taking over science experiments, several boys did discuss that the girls might be more hesitant to engage in lab work because they would be “afraid” of some things that were used or done in these activities. Additionally, Mallorie had stated that the girls were “scared to touch” things in science experiments (10.08_Lunch.mp4, 12:00-14:35). As a result, these students seemed to envision the girls as less likely to eagerly participate in science activities and such perceptions might be enhanced when, or if, girls stood and watched boys do the experiments as Haylee, Mallorie, and Nancy suggested in their comments noted earlier this chapter. The boys’ views were typically stated when they discussed how they envisioned the all-girl science class, often leading them to highlight ways in which they believed the class differed from their own.

Brian, for example, said, “[The all-girl class] wouldn’t be so ready to do experiments...Like dissecting stuff. They would be jumpy to it...They’d be afraid” (10.05_Lunch.mp4, 13:50-16:25). In a later interview, he echoed this idea and said girls would not like experiments that involved “nasty stuff...because it’s icky” (10.10_Lunch.mp4, 5:10-8:05). Steven similarly commented that, “I think they’re afraid of the chemicals that we’re gonna be using. They’ll be like, “Eww. I don’t want to touch it”...because, y’know, girls are afraid of basically everything...all the lab stuff that we do in science” (09.27_SRT.mp4, 13:45-18:45). Although these boys claimed that girls would not like “nasty stuff” such as dissections, some girls spoke positively about related experiences. For example, Michelle claimed science was “fun because we get to do...dissections and experiments” (10.04_SRT.mp4, 16:15-16:45). Mallorie also seemed

excited to explain that when she was five she watched her brother, “dissect[] a piece of [dog] poop” (10.08_Lunch.mp4, 3:40-6:50).

The boys’ comments suggested views regarding science, girls, and boys. To these boys, science involved chemicals, dissections, and nasty stuff, all of which were things they said girls would fear. By correlating science with things girls find frightening, the boys might be more apt to interpret girls’ reactions during science class as fear and they might be unlikely to see girls as students who enjoy science or as students who are similar to themselves. Likewise, their comments implied that boys are less afraid of things (whereas, “girls are afraid of basically everything”), especially not chemicals, dissections, and things associated with science.

When these boys made their comments, they had not worked with any chemicals in science class that year and the only “dissection” they had completed was of an egg to explore parts of a cell. Mitch discussed this dissection when explaining how boys and girls would behave differently. He claimed, “The boys would [dissect] it no problem and the girls would be slow to do it. They’d be poking and trying to crack it open. The boys just slammed it and opened it...[The girls would be slower] because they don’t like that nasty stuff and all that gooey and when they have to touch it if the tweezers drop in the egg and they have to pick it up they would not like it” (10.05_Lunch.mp4, 17:00-18:20). Brian, who was being interviewed with Mitch, agreed. According to this perspective, it would take the girls longer to open their eggs because they disliked the nasty gooey stuff inside and might possibly fear it. Examining girls’ behaviors during this egg dissection activity provides insight into how well Mitch and other boys’ perceptions held true in this lesson.

Egg Dissection Activity

Early in the unit on cells, students dissected an egg in order to explore parts of a cell. Mrs. Kinsey distributed store-bought eggs to groups of students and supplied them with tweezers and empty pie tins⁷⁹. Each group was to crack open its egg, place its innards into a tin, and examine it visually before and after poking, or ripping, open the yolk membrane. Ultimately, Mrs. Kinsey wanted them to complete a hand-written worksheet (see Appendix D) that was used by the other seventh-grade science teachers and had been used by Ms. Small in the past. The sheet contained one drawing of a bird's-eye view of their cracked open egg and another sketch of the cross section of the yolk and yolk membrane. The same three parts of these drawings were labeled "A," "B," and "C." Beneath these sketches was the word "Function" with the three letters, A, B, and C, and space beside each one for students to record what each letter represented and the function of that part. Mrs. Kinsey ultimately wanted letter "A" to be labeled the nucleus, "B" the cell, and "C" the cell membrane. Focusing on one lab group can highlight some important behaviors observed in the girls' class.

Lab group containing Susan, Haylee, and Michelle⁸⁰:

Susan, Haylee, and Michelle comprise one lab group. The pan containing their cracked open egg is in front of Michelle. She is holding tweezers directly above the egg's yolk. Susan sits across from Michelle (and the pan), while Haylee sits to Michelle's left. As I talk with the group beside them, Michelle says, to no one in particular, "Can we break these at all? I want to scramble it!" Hearing this comment, I tell her, "Don't break it until you see that little dot [which is seen in the sketches on their worksheets where it is labeled with the letter "A"]." Michelle replies, "I didn't see the dot." Susan leans forward, toward the pan, and points to a part of the egg with her mechanical pencil, showing the dot to Michelle. They

⁷⁹ Some students had brought their own eggs to school because Mrs. Kinsey had previously told students they could bring their own eggs, which would enable them to work in smaller groups.

⁸⁰ Video: *Per3_Girls_back10.04.mp4*: 41:50-50:55 and *Per3_Girls_front10.04.mp4*: 40:50-49:55

seem to then look at Susan's binder and move between those notes and Susan's worksheet. Haylee continues to sit in her seat, looking at Susan, with her pen poised above her own worksheet. She does not move towards the pan or Susan's notes.

Almost one minute later, Mallorie, a girl from the group beside them, says, "Michelle. Lookit." She displays a gelatinous substance, part of the egg, slowly oozing down her tweezers. Michelle uses her tweezers to grab a part of her own egg and says, seemingly towards Susan, "Eww. Watch when I pick this out." Susan looks at me, displays a playful look of disgust, with the edges of her lips turned downward and then says, "Let me try" and takes the tweezers from Michelle. Susan picks up some of the egg, holds it in the air, and lets it dangle towards the pan. Michelle exclaims, "Eww! Put it down, put it down, put it down!" Both girls smile and giggle. Michelle places her hand atop Susan's hand and they slowly bring the egg back towards the pan before releasing it from the tweezer's grasp. Michelle says, "I want to try now" and takes the tweezers. She starts tugging on the egg that is in the pan.

Although I move away from them and approach other groups to see what they are doing, the camera at the front of the room continues to pick up many of Susan, Michelle, and Haylee's behaviors. When Mrs. Kinsey comes by to speak with this group, she stands between Haylee and Michelle, effectively moving Haylee farther from the egg and her partners. Haylee does not make noticeable efforts to use the tweezers or look at the egg in the pan. A little more than two minutes after I left the group, Haylee turns her chair 180 degrees, so that she is now seated at the table located behind Michelle. She now sits at a table alone, having taken her worksheet and a pencil from her initial workspace. She is out of both cameras' views, until almost five minutes later when one camera pans across part of the room and sees Haylee writing on her worksheet, alone at her new table. Neither Susan nor Michelle had seemed to notice Haylee's departure as they continued to remain focused on their egg. At one point, Susan is seen pretending to eat raw egg and later Susan and Michelle place their hands in the pan and mash the egg's shell into the yolk and scramble the mix together within the pan. By time I return to the group, almost six minutes after I initially left them, Susan and Michelle have large smiles on their faces and Michelle lets out a laugh of joy, saying, "Ooh baby it's slimy."

The above excerpt focuses on one all-girl lab group during this egg dissection activity. Their behaviors serve to counter the perception that girls feared touching "nasty stuff," like the "goosey" parts of the egg, and strengthens the claim made earlier that some girls negotiate taking over experiments while some girls allow other students to do the experiment, even when these "other students" are girls.

Some Girls Do Like “Nasty Stuff”

Although Haylee seemed to express no interest in touching the egg with the tweezers nor her hands, both Susan and Michelle appeared very happy to handle what Mitch had called “nasty stuff and all that gooey.” Mitch surmised that girls would be slow to touch this material and that they “would not like it.” Michelle did say “Eww” when looking at some of the egg that Susan had picked up and Susan herself had what I viewed as a playful look of disgust on her face, but they did not seem to sincerely dislike touching the egg. They both readily continued picking up pieces of the egg and even placed their hands into the pan to scramble it and mash the egg with its shell. Susan smiled broadly as she pretended to eat some of the egg and Michelle seemed very excited to have her hands covered with egg, laughing and happily exclaiming how “slimy” it was.

In fact, many of their behaviors struck me as very similar to ones the boys exhibited when working on the same activity earlier that morning. Wesley and Allen, members of two different groups, used the tweezers to dangle “gooey” parts of the egg while members of their groups said “eww”⁸¹. Immediately following these exchanges, Jon dared Wesley to eat this piece of the egg, which reminded me of Susan pretending to eat some of her egg. Unlike Susan and Michelle, when Wesley and Chuck touched part of the egg, they quickly wiped their hands. When some of their egg started creeping down their upturned tweezers towards Chuck’s hands⁸², Wesley said “Eww” and repeatedly told Chuck to “flip it over” before Chuck accidentally dropped the tweezers in the pan. When the tweezers fell, Wesley exclaimed a loud “Augh!” and Max and Chuck laughed.

⁸¹ Video: *Per1_Boys_front10.04.mp4*: 23:25-23:50

Wesley picked up the tweezers, but there seemed to be a sense of him “not lik[ing] it” much like Mitch suggested the girls would exhibit when, or if, they had to pick up tweezers that they had dropped into their pans. Other boys were also heard saying “eww” when they used their tweezers to pick up pieces of the egg (e.g., Tyronne and Tim⁸³) and one boy commented, “That’s sick, dude” when a partner tried pulling part of the egg out of the pan with the tweezers. When this boy successfully dangled some of the egg directly above the pan, another boy in the group loudly exclaimed “Augh” and backed away from the lab table⁸⁴.

Boys and girls seemed similarly willing to handle this “goosey” stuff, and there appeared to be a few students in each class who were less interested in touching this material. Aside from Susan and Michelle, other groups of girls were heard exclaiming “Eww” at different points in the lab before excitedly moved towards touching the egg with their hands or tweezers. For example⁸⁵, as Kristen pulled some goosey material from the pan, her partners said “eww.” Kristen smiled and one of her partners, Tameca, put her hands around the tweezers and said, “Let me see that.” Kristen held onto the tweezers and plunged them back towards the pan excitedly saying, “Oh, wow! What did I do?” She pulled up more of the cohered material and stuck out her tongue in mock disgust as other girls in her group continued saying “eww.” She then handed the tweezers to Tameca, who grasped more of the egg. Others in the group kept saying “eww,” even leaning backwards at points as though wanting to move away from the egg, yet they jockeyed to use the tweezers.

⁸² Video: *Perl_Boys_front10.04.mp4*: 28:20-29:00

⁸³ Video: *Perl_Boys_back10.04.mp4*: 29:15-29:45

⁸⁴ Video: *Perl_Boys_back10.04.mp4*: 22:40-23:00

Clearly, it appeared as though many girls were just as willing as many boys to touch the egg. Students in both classes exclaimed “eww,” but these comments did not seem indicative of sincere disgust with the material. Without being in class together, no boys saw these girls’ reactions and students like Mitch were unlikely to have their views challenged. But even if these reactions were experienced in a coed class, how would they have been interpreted? If students, especially boys, believed girls would dislike handling the egg, might they have been likely to interpret these reactions as evidence that the girls found this science material, and possibly science itself, nasty? Similarly, might boys have felt pressure not to voice such reactions themselves in order to avoid being positioned as girl-like? Since I did not observe coed classrooms, these conjectures must remain as unanswered questions right now.

But if coed groups were to complete this lab, and boys were viewed as “taking over” the activity, would people interpret these actions as arising because these behaviors were “boy behaviors?” Would they suggest that these outcomes arose because the girls were uninterested or disgusted by the material, or possibly because the boys were more interested and willing to handle the eggs? The excerpt involving Susan, Haylee, and Michelle suggests that students’ “taking over” this experiment is not a result that can simply be attributed to students’ sex. As seen in this excerpt, taking over of experiments can happen in single-gender classes.

⁸⁵ Video: *Per3_Girls_back10.04.mp4*: 49:05-49:55

Taking Over the Egg Dissection Activity

Earlier this chapter, Haylee was quoted as saying that in coed classes, “[Boys] would want to do the experiment and kind of push the girls aside...[and] we just stand and watch them do it” (10.29_SRT.mp4, 10:20-12:30); however, a vignette from the mass and volume activity suggested that she actively removed herself from participating in a science activity with an all-girl group as she seemed to watch and allow another student to do all the work with the triple beam balance. In the above excerpt surrounding the egg dissection, she was again seen to actively remove herself from the lab work and the activity was taken over by Susan and Michelle. I am neither arguing that she removed herself after her partners took over the activity, nor that her partners took over the activity before she removed herself from it. Both outcomes seemed negotiated simultaneously, subtly or unknowingly among all three students, and I do not feel confident labeling one behavior as occurring before the other one, or as serving as a cause for the other outcome.

Although her partners did not make specific efforts to involve her, neither of them blocked her from participating. Haylee removed herself from the group and turned to another table to work on the worksheet alone. This outcome was partially the result of Susan and Michelle’s active involvement in the work, but it also arose because of Haylee’s active removal from the tasks. As discussed in the previous section, and strengthened by this excerpt from the egg dissection activity, some students might be ones who tend to negotiate “taking over” experiments while others might be ones who tend to negotiate removing themselves from science activities, at least relative to some

peers. Those who “take over” need not be males, and the students who remove themselves might not just remove themselves when in coeducational groups.

Conclusion

These analysis chapters have provided insight into the cultures of the two single-sex science classrooms at P.D. James Middle School and discussed identities that were constructed regarding who girls and boys were in these settings and what it meant to learn science as girls and boys in this team. This current chapter focused on some aspects of boys’ and girls’ identities and highlighted instances where these descriptions were not seen to hold true, such as seeing girls ignoring classroom instructions or boys expressing a relative lack of interest in science.

The chapter furthered these discussions first through explaining that boys were constructed as students who “take over” experiments while girls were more collaborative. Additionally, girls were identified as exhibiting a greater dislike for the “nasty stuff” that is used in science while boys were less averse to these things. However, excerpts and analyses showed that not all boys and girls adhered to the constructed identity that had been developed for their sex and class. Girls took over experiments and seemed as comfortable with specific “nasty stuff” as boys, while boys were seen to collaborate and work together on a lab activity. The existence of these counterexamples serves to caution practitioners and researchers from over-generalizing views about each sex of students.

Nevertheless, participants developed and constructed identities for boys and girls even when their experiences could serve to oppose these descriptions. After Haylee participated in lab groups where she negotiated having female peers “take over,” she

stated in an interview that this year's science class would differ if it contained boys because boys take over experiments. She did not acknowledge that girls take over experiments too and that this outcome arose in the all-girl science class as well. Similarly, Mrs. Kinsey maintained her constructed belief that boys were more interested in science, and girls were less interested, by attributing their socializing during lab work to different causes. Although she explained that girls who spoke with their friends during these activities were uninterested in the science, the boys who spoke with their friends were simply off task but not uninterested in the content. Therefore, although the examples introduced in this chapter can help counter-essentialize the sexes and their single-gender classes, this result was not readily apparent.

CHAPTER 8: DISCUSSION

This chapter revisits the research questions, introduces the emergent theory that has arisen from this work, and situates this work within the field of education research. It discusses implications, for researchers and practitioners, both from this theory and from the specific study that was the focus of this dissertation. Additionally, it notes some limitations of this work, discusses my newest perspectives on single-sex and coeducational schooling, and suggests future work that can be pursued with the data from this dissertation and, more generally, in the field of single-sex education.

Research Questions, Revisited

As stated in Chapter 1, this study explored the following research questions:

1. What perspectives for single-sex education populate one public middle school with such a program?
2. What do the cultures of two single-sex classrooms in this one middle school say about who boys and girls are and what it means to learn science as boys and girls?

Chapter 4 highlighted many perspectives for single-sex education that populated P.D. James Middle School. Participants' perspectives included the reasons these classes were said to exist along with related comments regarding differences between seventh-grade boys and girls. The purported reasons for these classes varied and were summarized into three main categories in *Table 5*: financial, socio-emotional, and academic. According to Mrs. Frost, a teacher who helped start the program, the initial

motivation for these classes stemmed from her own and Ms. Small's desires to curb the amount of sex talk and related behaviors that were exhibited in their classrooms. They believed separating the boys and girls would lessen these behaviors and later came to voice additional benefits, including academic ones, for these classes. Some participants echoed these sentiments and raised other reasons for separating the students, such as that the program might attract and retain parents.

Through their comments and related discussions, participants mentioned differences between boys and girls that provided insight into addressing the second research question. Differences that were introduced throughout the analysis chapters constructed identities for boys and girls and developed a more detailed picture of the culture of the two single-sex classes, especially in science. *Table 10* highlights some of the differences that were noted and shows that girls were seen as the more mature, better-behaved, more academically-capable sex, who had more advanced brains and a greater interest in grades and academic performance. The girls were constructed as idealized students, academically and behaviorally, but students who needed to be protected from boys' behaviors – both boys' dominating classroom behaviors and their aggressive (hetero)sexual behaviors. Conversely, boys were constructed as needing help both academically and behaviorally, but in the specific discipline of science boys were identified as the sex that was more interested in the content. Furthermore, boys gained greater exposure to argumentation, a skill that could assist them in future science courses and careers. Therefore, although the all-girl class, and girls themselves, was identified as better overall, the culture of the boys' class better prepared them in science and was more likely to enhance their interest and performance in the discipline.

Selected differences between boys and girls	
Girls	Boys
More advanced brains	Less advanced brains
Better verbal capacity	Worse verbal capacity
More interest in grades	Less interest in grades
Less interest in science	More interest in science
Less argumentation in science class	More argumentation in science class
Work more collaboratively	Take over experiments
Better behaved	Worse behaved
Seek physical connections	Seek sexual connections
More mature	Less mature

Table 10: Selected differences between boys and girls in this single-gender team that were introduced in this dissertation.

This table neither highlights all of the differences that were raised throughout these analysis chapters nor aims to do so. Some other differences (e.g., girls have better hearing, boys are more advanced in terms of muscle growth and strength) supply additional information regarding the identity of boys and girls in these single-sex classrooms and the culture of these classes (e.g., boys experienced more infantilizing approaches to classroom discipline), but the table notes some major differences that were constructed regarding who boys and girls were in this team and what it meant to learn science as boys and girls in these classes.

Although each sex of students developed its own identity, which was constructed alongside each single-gender class developing its own unique culture, Chapter 7 highlighted that individuals within each class acted in ways that opposed how their class, and members of their sex, were identified. For example, opposing some items listed in *Table 10*, there were girls who said science was their most interesting class while some boys said it was one of their least interesting classes, and there were girls who took over

experiments while there were boys who worked collaboratively. Although these events were noted, they did not seem to impact or alter participants' views as their comments and behaviors acted to maintain constructed differences between the two groups.

Instead, boys and girls, and the culture of their two classrooms, were regularly defined relative to each other and efforts were made to maintain these constructed differences. As a result, the classes and students were hierarchically ranked in ways that often pitted one sex of students, or the entire class, as better or worse than the other. This outcome agrees with Wilchins' (2002) view that binary systems create hierarchy and it leads into the theory that emerged from this dissertation.

Emergent Theory

The theory emerging from this study is that single-sex policies arise and survive through an endorsement of exclusion, which perpetuates the construction of differences between the sexes. In agreement with queer theory, separating boys and girls into distinct classes sends implicit and explicit messages that students *can* be divided into two groups, each of which differs from the other (Wilchins, 2004). Possibly as a result, people engaged in these settings develop and perpetuate notions of difference between boys and girls that allow distinct identities for members of each sex to be strengthened. As a result, single-sex settings reinforce, and reify, "gender differences," constructing identities and cultures for boys and girls that could have substantial effects on students' understanding of themselves and other students, their future academic and professional pursuits, and their relationships with other people.

Endorsing differences between girls and boys can limit students' identities: these constructions teach limited conceptions of what is appropriate behavior for boys and girls and might direct students towards, or away from, certain disciplines and careers. Overall, single-sex settings tend to socialize students and teachers into simplistic and narrow understandings of these two classes and the students who comprise them. As Gutiérrez and Rogoff (2003) warned, normative views can appear benign but ultimately support a reductive tendency to seek singular effects to social and cognitive phenomena. In this case, the singular effect is students' categorization as members of a certain sex, or as non-members of the "other" sex.

This theory neither suggests that all students are the same nor that single-sex schooling is detrimental to all students in all instances. Similar to perspectives regarding contemporary policies that endorse inclusion and the mainstreaming of students who have historically been separated from their peers (e.g., special-needs students and English as a Second Language students), this theory acknowledges that people often categorize students into groups and supplies reasons not to segregate and exclude students in a school setting. Such segregation reinforces constructions of difference and perpetuates binary systems and dimorphic, hierarchical language wherein one sex of students, or one class of students in a single-sex program, is cast as "better" than the other sex or class of students. However, the theory does not dispute the reality that some students and teachers might thrive academically, socio-emotionally, or otherwise, in specific single-sex settings. Additional studies should explore these settings and appropriately modify the theory to better reflect the data and theory that emerges from these studies and settings.

Although the emergent theory suggests that, in a broad sense, single-sex environments construct (or reinforce) notions of difference regardless of the specific academic discipline, the theory and data generated from this dissertation have specific implications regarding identity work in single-sex middle school science classrooms. These settings might maintain disparate outcomes that have been reported in the past for boys and girls in science (Freeman, 2004; Kelly, 1985; Shepardson & Pizzini, 1992). For example, Shepardson and Pizzini (1992) reported that elementary teachers treated boys and girls differently in coeducational science classes in ways that might have sent more positive messages to boys, and more negative messages to girls, about their abilities in science. Such interactions could contribute to the outcome whereby boys outperform girls in many science disciplines, take more advanced science classes, and express greater interest in science (Freeman, 2004; Stables, 1990). However, the single-sex science classes studied in this dissertation show that students in these settings might also receive messages that will benefit boys in science and maintain or develop constructions that girls are worse at science or less suited for that field. Similarly, teachers in these single-sex settings, such as Mrs. Kinsey, might be more likely to encourage or allow certain behaviors in the all-boy class – including argumentation, the weighing of additional personal belongings during lab work, or conversations pushing students to analyze their methods and measurements – that suggest that the boys were viewed as better science students or students with a greater interest in science, which could possibly benefit them in later science courses and careers.

Additionally, girls might be likely to maintain their constructions that boys are “better⁸⁶” at science or tend to “take over” lab work, thereby dominating these spaces and continuing to relegate girls to more backgrounded roles. The girls are active in negotiating these constructions and outcomes, and by being separated from the boys their constructions regarding gender and science might not be disrupted or revisited. Likewise, boys might maintain their constructions that girls are more likely to dislike “nasty stuff.” As a result, both girls and boys might maintain disparate views regarding typical behaviors exhibited by boys and girls in science. Even teachers who interact with both boys and girls in science, as Mrs. Kinsey did, might maintain their distinct constructions for members of each sex or take actions to maintain these constructions (e.g., interpret similar behaviors differently or have one class spend more time analyzing data) instead of revisiting them based on events that transpired in class that countered those constructions. Thus, the study shows that separation of the sexes in science class does not necessarily remove influences that analysts have suggested contribute to conditions for gender or sex bias in science education.

Related to the emerging theory’s implications surrounding constructed differences between boys and girls and science is that single-sex settings influence students’ identity development. These environments impact students’ understanding of what it means to be girls or boys (or “not boys” and “not girls”) and might not disrupt notions surrounding what are “appropriate” identities for members of each sex. For example, both girls and boys might maintain stereotypical notions that girls express greater fear and dislike surrounding some of the activities and materials often used in many science classes,

⁸⁶ Refer to comments from 10.19_Lunch.mp4, 6:15-11:25. This quote, and some related ideas, are noted and discussed in Chapter 6.

while boys are defined, in part, as the students who dominate lab activities. Even if these specific identities did not arise in a particular setting, the emergent theory suggests that students would develop or strengthen views that they differ from the “opposite” sex and that these differences extend to more than just their genitalia. Specifically in science, the students might maintain disparate constructions that will benefit members of one sex more than the other and could lead them to identify more or less as students who can succeed and be interested in science.

Situating this Work

Before delving more deeply into the implications of this work and the emergent theory, it is valuable to briefly situate its importance in the broader education community. As noted in Chapter 1, previous papers and reports have concluded that there is little evidence to strongly support endorsing single-sex programs over coeducational ones (Arms, 2007; Mael, 1998; Salomone, 2006; U.S. Department of Education, 2005a). Many of these writings noted the dearth of quality research that has examined these environments, stating that few studies have explored these settings. This dissertation addresses that dearth of research through employing rigorous methods to explore questions related to single-sex middle school science classrooms and develop a theory regarding these environments. Unlike many papers and voices that have contributed to conversations surrounding single-sex public education, this work grounded its arguments in data, rather than ideology (Arms, 2007).

This dissertation is one of a very small set of research studies that has explored these offerings, especially in middle school science classrooms. Unlike many of the prior

studies of single-sex education, especially those that focus on science or mathematics, this study was interested in outcomes for girls *and* boys. The data and emergent theory support the view that effects on members of one sex have important effects on individuals of the “opposite” sex.

They suggest that some of the concerns raised about the amended Title IX regulations deserve further examination, such as the push to develop stringent review procedures to ensure that girls and boys in these environments receive equal, or at least “substantially equal,” experiences. As evidenced in this study, even when the all-boy class and all-girl class could be argued as being “substantially equal⁸⁷” to each other because they had access to the same teacher, books, instructional materials, and technology, one, or both, class(es) might still be “shortchanged” in that the girls might get less exposure to certain skills that are valued in science while the boys might develop understandings that they are worse students.

While Streitmatter (1999) supported single-sex opportunities for girls because of attitudinal benefits she and other writers had reported for girls in these environments, this dissertation raises concerns that such environments might do little or nothing to disrupt teachers’ notions that girls are less interested, or possibly less capable, in science. Additionally, these settings could negatively impact girls by granting them less exposure to valued skills, such as argumentation, that might benefit them in future science courses and careers. Similar to results reported by Baker (2002), the all-boy class in this study acquired a negative stigma of being worse than the girls’ class and the teachers seemed to like the girls’ class more. The consequences of such labeling might impact the students’

sense of self and their likelihood to identify as good students or as people who can succeed in school. Although the girls might develop more positive identities regarding themselves as successful students, the generated data suggests that it is the boys in this setting who might be better prepared to pursue future science opportunities. Therefore, the differences noted in this setting might lead to a similar result as reported by Wood and Brown (1997) who noted that girls who took single-sex math classes were not any more likely to take additional math and science classes.

As demonstrated above, this dissertation builds upon some of the research and dialogues that have preceded it. Additional studies, including more longitudinal investigations, could explore whether some of the reported differences in these settings correlate with specific outcomes for these girls and boys. Regardless, this dissertation has a number of broader implications for various audiences.

Implications

As noted, this work has several implications for multiple audiences. It provides suggestions for policy makers, researchers, administrators, teachers and students, the field of science education, and discussions surrounding middle school and adolescence. As a result, this work can contribute to dialogues surrounding each of these topics. A number of the implications for these diverse audiences and areas overlap, but I will describe suggestions for these groups separately. The following paragraphs provide an introduction to some ideas that could be further developed and supported from the large amount of data generated in this study. They provide several starting points for future

⁸⁷ Review Chapter 1, and “34 CFR Part 106: Nondiscrimination on the basis of sex in education programs or activities receiving federal financial assistance” (U.S. Department of Education, 2006a) for more

directions and writings, each of which might need to be shaped differently given the diverse array of groups to whom this research can speak.

Policy Makers

The results of this work suggest that policy makers, as well as other individuals involved in educational systems, should be hesitant about embracing the recent rise in single-sex offerings in public schools. This dissertation cautions that single-sex policies can implicitly support divisive thinking that leads boys and girls to be hierarchically ranked in ways that could be constraining. Policy makers should be wary of endorsing changes that might seemingly rely only on separating students for positive outcomes to arise. I am not suggesting that all advocates of single-sex offerings believe that separating boys and girls is enough to ensure change among students, but am urging policy makers to consult multiple sources regarding these settings before supporting such changes.

In working for the best interests of students and families, policy makers should seek to follow the U.S. Department of Education's own advice, as stated in their *Strategic Plan 2002-2007*, and noted in Chapter 1, which reads, "Part of the cultural transformation needed throughout the American education system is the switch from a fascination with instructional fads to a focus on scientifically based research" (U.S. Department of Education, 2002). It is therefore important that policy makers employ skepticism before endorsing any change of this magnitude. They should seek quality information regarding the affordances and constraints single-sex environments could provide and explore what other factors (e.g., teacher training) affect these outcomes. As mentioned earlier, many people express reasons to support and oppose these settings without having studies to

information on the term "substantially equal."

support their claims. It might be impossible for policy makers to seek unbiased perspectives on this issue, but they should employ information about boys, girls, and single-sex education that is data driven and not ideologically driven when making their decisions.

Researchers

Related to some of the comments listed above, more quality research needs to explore single-sex offerings in public schools and investigate factors that affect various outcomes these opportunities might afford. A later section in this chapter, titled “Future Work,” will provide more details regarding future studies and analyses I and other researchers can pursue in this field. But in general, this study has strengthened my view that it is important for more work to be done in this area and implies that valuable insights about single-sex settings can be generated from qualitative studies that investigate these environments. Many of the results reported in this dissertation were developed and strengthened from classroom observations and conversations that transpired during lessons. Large-scale studies might not have provided a format for similar findings.

However, I strongly support the use of multiple methodological studies – quantitative, qualitative, and mixed methods – to focus on varied elements of single-sex education. To me, no approach is better than others, but different questions can determine whether certain methods are more or less appropriate. In general, more research should explore single-sex education. These studies can investigate students’ academic performance, their interest in different disciplines, their self-concept, or many other

outcomes. There are many questions that can be asked, outcomes to explore, and variables that can affect the outcomes and generated theories. Given the growth of single-sex public education, and the amended regulations to Title IX that might lead more of these settings to appear in public schools, it is important that the research community contribute to the growing discourse surrounding this issue.

Additionally, this work implies that studies investigating single-sex education should look at both boys and girls. By only focusing on girls, or only on boys, researchers might be omitting important information and constraining the interpretation of their data. As noted earlier, the majority of research of single-sex education has focused on female students but these settings have effects on all students (Mael, 1998). As evidenced from this dissertation, outcomes for girls in these settings can affect outcomes for boys (and vice versa).

Administrators

For schools that do adopt single-sex classrooms, this work implies that the administrators should make strong efforts to ensure that their teachers are well trained and supported in teaching in these settings. Mrs. Kinsey received little information and support regarding these classrooms and how she might effectively leverage this structural aspect of the team in ways that would benefit students. Similarly, Mrs. Frost relied heavily on her own readings, experiences, and intuition concerning ways to best teach these classes. Administrators and schools that choose to move forward and implement such offerings should seek means to provide faculty members and administrators with information about boys, girls, and single-sex education. As mentioned earlier, the

teachers, students, and school will be best served if this information is data driven and not ideologically driven.

Additionally, administrators should be aware of their teachers' perspectives regarding these classes. As evident in this work, some administrators' reasons for these classes might not overlap with reasons voiced by their teachers (see *Table 5*). Although I do not believe these individuals' reasons need to match perfectly, I think the school and students would benefit if these people were able to voice some shared reasons for these sex-segregated classes. At P.D. James Middle School, it appeared as though Principal Davis was not on the same page as the teachers who initiated the program. Although that might not have led to any major concerns during my time at the school, such discrepancies in perspectives could confuse parents, students, or other teachers. Additionally, the reasons for having the single-sex classes should impact whether or not that school deems these classes to be successful. Therefore, if members of the school disagree about the reasons for these classes, the implemented strategies might not explicitly aim to meet each stakeholder's concerns, and it might make it difficult to agree on whether the implemented strategies are effective.

Teachers and Students

As mentioned earlier, the theory that has emerged from this work does not suggest that all constructions about boys and girls are false, but acknowledges that these conceptions are regularly renegotiated and might not be applicable to all members of a given sex. Therefore, this work does not suggest that teachers should cease trying to relate academic content to students' interests (e.g., football or makeup), but advises that

teachers should reflect on these activities and lessons to see if they align with their specific students' interests, regardless of if the students are labeled as boys or girls. Practitioners should be attentive to within-sex variability and should expect some boys and girls not to fit a constructed mold for "boy" or "girl." One suggested approach for teachers is to have them actively seek instances in which approaches to instruction or classroom discipline prove ineffective with individual students and to explore and renegotiate means to best interact with these individuals.

Additionally, this study implies that girls might develop more positive views of themselves in single-sex settings, especially if those teachers and programs position them as "better" than the boys. By extension, these constructions could adversely affect the boys' views regarding school and their ability to perform well academically or behaviorally. Although this dissertation did not focus on evaluating the girls' (or boys') views of themselves as students, as it only suggested constructions that were developed, additional studies could seek means to explore both these constructions and their impact on students' views of themselves. Future studies involving these students, or studies in other settings, could investigate these possibilities further.

Science Education

Specifically in the field of science education, this dissertation suggests that single-sex settings might not disrupt stereotypical constructions and might serve to maintain or construct such understandings. Although girls in these settings could be viewed as better students, they might still be disadvantaged in certain disciplines like science. The teacher might believe boys are more interested in this discipline and related activities and

therefore – possibly unknowingly – interact with the boys and girls differently such that these constructions remain or become strengthened. As a result, single-sex science classrooms have the possibility to reproduce disparate outcomes for boys and girls that have been reported during the last few decades whereby males exhibit more interest in science and are more likely to obtain careers in science (Fennema, 1990; Freeman, 2004; National Academies, 2007).

This study suggests that teachers might need more information and training regarding means to evaluate and modify behaviors that could lead to gender bias. Although these tools might obtain special importance in single-sex settings, they could benefit teachers in coeducational settings, too. Additionally, teachers and students should develop means to challenge traditional constructions regarding intersections between science and gender in an effort for people to challenge, or at least consciously consider and reflect on, these understandings. By not having members of the “opposite” sex in students’ science classrooms, students might be less likely to experience situations that challenge their constructions concerning students of the “opposite” sex, including these students’ interest in, and relationship to, science.

Middle School and Adolescence

The generated data provided multiple instances where students explained understandings of themselves – often relative to other students – and they seemed eager to define themselves. Whether these instances involved explaining that boys “take over” experiments or that girls dislike “nasty stuff,” these middle school students were involved in identity development (Erickson, 1968; Zittleman, 2007). The students’ comments

focused on many aspects of the “kind of person” they were, or were not, in given contexts, including the kind of academic, behavioral, and sexual persons they were (Gee, 2000/2001). Future writings could develop individuals’ identity work or explore how specific aspects of one or more students’ identities were constructed in these settings (e.g., how they developed their identity as heterosexual students through homophobic behaviors). Regardless, the results discussed in this work suggest that these adolescent middle school students were engaged in constructing understandings of who they were and who they were not.

All of the implications mentioned in this section arise from my experiences at P.D. James Middle School, and I acknowledge that there might be variability among schools with single-sex programs. The fact that this study focused on one particular school could lead some researchers and practitioners to claim that the results and theory might not be applicable to other settings. This argument, as well as other possible limitations of this study, is worth exploring in more detail.

Limitations of This Work

Indeed, this dissertation did only focus on one middle school and the reported results were certainly influenced by the specific participants in this study. However, the theory that emerged from the generated data and analyses suggests that similar outcomes might arise in many single-sex settings and this claim will be strengthened in the remaining pages. Regardless, specific aspects of this research site affected the data and analyses in unique ways and future studies could contribute to further developing the proposed theory.

One important limitation is that this study primarily contained data that was generated during the first marking quarter of one school year. The participants' comments, experiences, and behaviors might have changed in important ways as the year progressed. For example, Mrs. Kinsey's constructions for girls or boys might have been strengthened or modified as she had more experiences with each class. Likewise, students' comments might have changed as more time unfolded as they possibly became more comfortable, or uncomfortable, with these environments. Additionally, since Mrs. Kinsey was new to the curriculum and the position itself, it took her some time to adjust to her role. She acknowledged that she was behind her science colleagues in terms of what activities she covered the first quarter (Mrs.K5_10.30.mp4, 20:34-21:20), and this limited the number of science-specific activities and lessons that I was able to analyze. Having more data and lessons would have afforded me the ability to possibly strengthen or modify some claims.

Another limitation to this dissertation was that it did not include a coeducational classroom in the design. Although I initially hoped to focus on one all-boy, one all-girl, and one coed class, I was unable to locate a geographically-convenient public school that contained such an arrangement. P.D. James Middle School had coed science classrooms in the seventh grade, but they were not included in the study for a few reasons. They were excluded, in part, because they would have increased the number of variables in the design and lessened the rigor of the study that was conducted. These coeducational courses were taught by different teachers than those teachers leading the single-sex classes, and the number of days each week spent on science differed between the single-sex and coed courses (i.e., since the coeducational teams had four teachers, these science

teachers typically met with their classes once each day). Additionally, scheduling difficulties at the school would have made it impossible for me to consistently observe both the coeducational and single-sex science classes. Nevertheless, studies that investigate aspects of single-sex and coeducational environments at the same school could contribute much to this field.

Related to this concern is the question of whether my results were unique because of the particular teachers who were involved in the study. Teachers with different backgrounds from Mrs. Kinsey and Mrs. Frost might have taught single-sex classrooms differently, but Mrs. Kinsey's and Mrs. Frost's backgrounds might overlap with the backgrounds of many teachers who currently teach, or are considering teaching, these classes. Mrs. Kinsey had no training or background in teaching sex-segregated classes, while Mrs. Frost's background in this area consisted of her experiences with family members in single-sex settings, experiences accrued from teaching these classes for several years at P.D. James Middle School, and self-selected readings and workshops. As a result, both teachers relied primarily on their own intuitive understandings of how to teach these classes. While these particular teachers affected the data in unique ways, their limited background in teaching sex-segregated classes and reliance on their own intuition – much like many teachers who might lead such classes – could suggest that similar outcomes would arise for many teachers in similar contexts.

In fact, having one teacher who was a veteran of this program and one teacher who was new to these environments was a strength of this study as it enabled me to generate information from different vantage points. Mrs. Frost was firmly supportive of the single-sex arrangement, whereas Mrs. Kinsey was more hesitant to fully endorse it.

Nevertheless, both teachers constructed differences for boys and girls and contributed to the theory that was developed.

Related concerns involve the overall generality of the results and theory noted in this dissertation. As discussed in Chapter 2, I, like other ethnographic researchers (e.g., Purcell-Gates, 2004), readily admit that I was not seeking knowledge that was universally true. I sought localized knowledge that could contribute to dialogues surrounding single-sex education, coeducational schooling, science education, gender and education, and the intersections among these dialogues. Additionally, this work provides information and insights that allow for “case-to-case” generalizing whereby readers can seek similarities between the settings discussed in this dissertation and in other situations (Firestone, 1993). Additional studies have the ability to further develop the emerging theory and better articulate the conditions under which specific outcomes might occur.

My Perspectives on Single-Sex and Coeducational Schooling at the End of this Study

In Chapter 1, I introduced “My Perspectives on Single-Sex and Coeducational Schooling at the Start of this Study” and wrote,

I started this work without strongly favoring or opposing either setting...[T]he answer might vary school-to-school and one form of schooling might be beneficial for some, but not all, students (AAUW, 1998; Mael, 1998)...Although I disagreed with many popular beliefs that men and women were inherently different, and therefore might possibly benefit from different classrooms or possibly different pedagogies, I could not fully deny that a part of me accepted and agreed with this notion of difference...I believed that men and women were

more alike than different but that there might be differences that could be utilized in ways to positively affect some educational outcomes.

While I still agree that the exact outcomes might vary school-to-school, this study has led me to more strongly believe that single-sex schooling might construct or strengthen people's perceptions regarding differences between boys and girls. I still am not comfortable saying that there are no "true" differences between boys and girls that could be utilized to improve their schooling experiences⁸⁸, but believe that single-sex arrangements supply a foundation implying that girls and boys differ, and this structure allows and encourages dimorphic constructions to be fostered and go unchallenged.

These ideas relate to another limitation of the study that might be raised. Related to a concern mentioned earlier, namely that the study only focused on two specific teachers, is the concern that I primarily focused on these teachers' single-sex classrooms (i.e., I neither videotaped coed electives nor did I ask many research questions that focused on specific coeducational classrooms). Therefore, it might be argued that these teachers would have behaved similarly in coed classes and would have helped foster similar constructions for boys and girls in these coed settings as were constructed for them in the single-gender settings. If this result were true, then the fact that this team was single-gender might not be a critical factor in the reported outcome.

This concern is important, and serves to reemphasize the need for researchers to investigate both single-sex and coed settings in the same studies, but my reflections on this work and my perspectives at the end of this dissertation lead me to think that the single-sex environment was an important factor in leading to the results and the theory

⁸⁸ I would also note that I do not know what these differences are or if there are any.

that emerged. While it is true that some similar outcomes might have been reported in coeducational classrooms led by Mrs. Frost or Mrs. Kinsey, I believe the fact that the boys and girls were segregated led constructions for each sex to be less likely to be challenged and more likely to be maintained or developed. Since the students would not be in classes together, they would be less likely to experience situations that would challenge their concepts (e.g., girls enjoying working with “nasty stuff” or boys working collaboratively).

In fact, I would guess that the people who would most likely have their constructions challenged would be teachers who actually worked with both classes and saw girls and boys behaving similarly to each other (or saw the girls and boys behaving differently than these teachers initially thought each sex of students would behave). However, as noted in this dissertation, Mrs. Kinsey took actions that led her to maintain perceived differences between boys and girls and her experiences did not lead her to disrupt her constructions. It would be interesting to talk with her more in the future, as she spends more time teaching these single-gender classes, to see if she more firmly believes that boys and girls differ in certain ways.

Of course, the ideas presented above were prefaced by noting that they represent my “guess.” After completing this dissertation, I tend to more firmly believe that single-sex settings increase the likelihood of gender differences becoming reified but acknowledge that this idea warrants further research. There are many possibilities for additional research involving single-sex education.

Future Work

The field of single-sex education research, especially within U.S. public schools, is a relatively new area that has many research opportunities. This dissertation has led me to have more questions, some of which could be pursued in more detail with the rich data generated in this study. Some of these topics almost became focal points of this dissertation – such as “heteronormativity” and “teacher gender” – and some readers might notice the seeds of these discussions sprinkled throughout the previous chapters. I think these topics are worthy of further exploration, but I ultimately elected to constrain my focus to the questions reported in this dissertation. These additional topics were mentioned when appropriate in this text, but a more principled inquiry into these areas could yield additional results and impact the generated theory.

For example, Mrs. Frost, Mrs. Kinsey, and many students alluded to the idea that boys and girls were separated, at least in part, to stem the amount of sex behaviors that arose in class because students were romantically or physically attracted to members of the “opposite” sex. These views suggest that the students were assumed to be heterosexual but there might be more ways these sex-segregated classes communicated these messages and the effect of such messages could be explored through additional studies. Likewise, future research could investigate how the teacher’s gender – including whether the teachers might have been viewed as more male-like or female-like – impacted students’ interactions with them and their understandings of what it meant to be boys and girls. The two teachers involved in this study might be argued as exhibiting different gendered behavior (e.g., Mrs. Frost was viewed as “mean” while Mrs. Kinsey was “nice” and possibly constructed as being more nurturing or maternal), and might

affect students' constructions differently. Similarly, future studies could explore how or if results would be impacted by having male teachers lead single-sex classes.

With the data generated in this study, additional work could focus on individual students, such as Haylee or Mitch, and investigate their specific behaviors and experiences in these single-sex classrooms. As presented in this dissertation, excerpts from classes and interviews helped address the research questions but no individual student was the primary focal point of the analyses. Instead, a reworked analysis could trace individual students' engagement across activities and lessons to develop a more detailed description of their personal experiences in this setting. Before delving into reworked analyses that focus on specific students' personal experiences, I want to engage in more informant checking of the analyses conducted thus far. As noted in Chapter 2, I supplied some participants with my analyses, but have not received feedback from them. It is my hope to speak with them more about this work, and include students in these discussions, in order to enhance the validity of the data and analyses and ask for their feedback. I want to ask them whether they believe the descriptions and interpretations were accurate and to add their own response(s) or writing(s) if they would like.

Additional studies that investigate other schools and classrooms could similarly contribute more to discussions surrounding single-sex education. As suggested from the earlier section discussing limitations of this dissertation, future studies should explore how teachers' backgrounds, including their pre-service training and professional development, impact single-sex classrooms that are implemented. Similarly, studies can investigate how parents' and guardians' roles in these schools, such as their support or

opposition to these environments, affect various outcomes including students' performance, attitudes, and constructions of what it means to be boys and girls.

Studies that can include coeducational environments in their design, without sacrificing too much of their rigor, can contribute much to this area of research. These investigations can provide greater comparisons among the different classrooms and add to the dialogue regarding which environment might be "best" for students (or for specific students in specific settings). Related to the notion of a "best" environment, research should explore a multitude of outcomes to see how single-sex offerings, and factors that affect these offerings (e.g., teacher background), impact students' performance, attitudes, interests, confidence, and more.

Studies can explore single-sex settings that initiated programs for different reasons to see how, or if, these differences impact students and teachers, including the cultures and identities that are constructed. Likewise, researchers should consider more longitudinal studies that explore how these environments might affect students' futures. The students in this dissertation experienced a single-sex environment in seventh grade but might not have another sex-segregated class through their completion of high school. How do such arrangements affect students similarly and differently than settings where students are segregated all through middle school or high school? Similarly, studies can investigate how students are affected by having sex-segregated schooling experiences at different grade levels or in different disciplines. Are the effects different depending if the students are separated in an elementary classroom or a high school classroom? What if the high school students were separated for science class but not mathematics?

As noted at the start of this section, there are many topics that can be explored within the field of single-sex education, especially within public school settings in the U.S. The recent amended regulations to Title IX that have attempted to expand the circumstances in which these classes are permissible in public schools, along with the fact that more schools are implementing such programs and the reality of the limited amount of quality research that has explored these settings, makes it an important field for researchers to explore in more depth. These studies can have great impact on school policy, teacher training, and student outcomes.

Conclusion

This dissertation contributes to dialogues surrounding single-sex education and has led me to see how these environments can further construct differences between boys and girls. Many people take the statement, “Boys and girls are different” as a fact, but is it? If it is true, in what ways do they differ? This work strengthens the perspective that differences can be constructed and a single-sex environment might endorse such constructions. Although the act of defining “boys” and “girls” constructs these groups as different from each other by delimiting and defining characteristics that make individuals “boys” or “girls” (“not girls” and “not boys”), single-sex offerings provide a structure that is readily amenable to these constructions and can lead to constraints on students’ identities.

Single-sex offerings have the potential to impact many student outcomes and are worth exploring in more detail. This dissertation has not led me to oppose these settings outright but raises concerns about embracing them and the potential effects these

environments, and related policies and legal changes, can have on students. I encourage additional studies to explore these settings and to contribute more to supporting, opposing, or modifying the theory generated through this work.

APPENDIX A: CALENDAR OF THE FIRST MARKING QUARTER

The following calendar notes some important events regarding the methods and data generated in this study during the first marking quarter at P.D. James Middle School.

SEPTEMBER 2007				
Mon	Tues	Wed	Thurs	Fri
3	4 First day of school Each single-gender class typically met for about two hours of science on Tuesdays	5	6 Each single-gender class typically met for about two hours of science on Thursdays	7 Each single-gender class typically met for about one hour of science on Fridays
10	11 Observed Mrs. Frost's classes First began recording field notes	12	13 Began observing science classes Began audio recording lessons	14
17	18	19	20 Curriculum Night: Spoke with parents/guardians about the study	21
24	25 Began interviewing participants	26	27 Began videotaping classes	28
OCTOBER and NOVEMBER 2007				
Mon	Tues	Wed	Thurs	Fri
1	2	3	4	5 A speaker's visit led Mrs. Kinsey to cancel science
8	9 Statewide testing led each science class to meet for about one hour today	10	11 Statewide testing led each science class to meet for about one hour today	12
15	16 Statewide testing led each science class to meet for about one hour today	17	18	19
22	23	24	25	26
29	30	31	1	2 End of marking quarter Last day observing science lessons

APPENDIX B: INTERVIEW GUIDE

The interviews followed a semi-structured format and this guide shows questions I aimed to ask during many of the open-ended interviews as well as some questions that were developed based on events that transpired during my time at P.D. James Middle School. Questions are divided into sections denoting questions for: (1) Principal Davis (A1a-A10a), (2) Mrs. Frost (TF1a-TF25a), (3) Mrs. Kinsey (TK1a-TK47a), and (4) students (S1a-S32a). The conversations were semi-structured in that they did not rigidly adhere to a pre-scripted question order and wording (Purcell-Gates, 2004). Some items that impacted the conversations and led them to deviate from this guide included events that happened the day of the interview, things that were said during earlier interviews, or topics raised by the participants in that particular interview.

Questions for Principal Davis

- A1a. Why did the school decide to have all-girl and all-boy classes?
- A2a. Why does only one team contain all-girl and all-boy classes?
- A3a. How is it determined which students will be placed into the team with the all-girl and all-boy classes?
 - b. Can parents/guardians opt to have their child(ren) placed, or not placed, in these classes? If so, how?
 - c. Can students opt to be placed, or not placed, in these classes? If so, how?
- A4a. Why has the school chosen to maintain these all-girl and all-boy classes since the 2000-2001 school year?
- A5a. Have these classes' "effectiveness" been assessed?

b. If so, how?

c. If they have been found to be effective, have efforts been made to expand all-girl and all-boy classes to other teams and grades?

i. How do different people in the school view this option?

A6a. I read the “course description” for the elective “Tomorrow’s Young Men and Women” and had some questions about this course. How many years has it been taught?

b. Did Ms. Small create it?

c. What is the course about?

d. It seems that there are different objectives for the girls and boys in the class⁸⁹. Can you explain more about that and describe the objectives? Do you know why there are different objectives, or have any ideas as to why there are different objectives?

A7a. When and why should students receive detentions?

b. Do you think they are effective?

c. Have boys or girls received more detentions thus far, or about the same? Why do you think that is the case?

A8a. Do you think the single-gender science classes would be different, or stay the same, if they were taught by a male? Why or why not?

b. If you do think class would be different, how do you think it would be different?

A9a. Do you think single-gender classes can over-emphasize gender as the main influence in educational outcomes and possibly overshadow other factors that impact a student’s learning (possibly moreso)?

A10a. Principal Davis agreed to provide me with information regarding:

⁸⁹ The course description, for this 10-week course, reads:

Girls—To assist girls in the development of their skills, talents, and abilities. To discuss where they are, where they want to go, and the process (work) necessary to get them there.

Boys—To assist males in their transition into young men. To help them see themselves differently; and in turn, the world will perceive them differently. Ranging from conscience to etiquette, to dignity.

- a. the age, sex, and any additional demographic information that is public regarding the students in this study
- b. how many students are enrolled in the school
- c. demographic information about the student body and faculty as a whole and by grade (e.g., breakdown in terms of race, sex, free and reduced-fee lunch)
- d. any means to assess how academically competitive the school and district are (e.g., what future schooling or career paths graduates tend to follow, average scores of standardized tests, etc.)

Questions for Mrs. Frost

- TF1a. What is your teaching background and experience?
 - b. Why did you become a teacher?
 - c. How long have you been teaching each language arts? Mathematics? Middle school? These curricula? All-girl and/or all-boy classes? Coed classes?
 - d. What other subjects, if any, have you taught? Where? For how long?
 - e. Which of these institutions had all-girl or all-boy classes? Which of these institutions were public schools?
 - f. What aspect(s) of interacting with this current age group most appeals to you?
- TF2a. What training, if any, did you receive concerning ways to best teach girls/boys based on their sex?
 - b. Describe how pre-service training prepared you to teach girls and boys together and separately.
 - c. Describe how professional development experiences prepared you to teach girls and boys together and separately.
- TF3a. Why did the school decide to have all-girl and all-boy classes?
- TF4a. Why were you interested in teaching all-girl and all-boy classes?
- TF5a. Why does only one team contain all-girl and all-boy classes?

- TF6a. How is it determined which students will be placed into the team with the all-girl and all-boy classes?
- b. Can parents/guardians opt to have their child(ren) placed, or not placed, in these classes? If so, how?
- c. Can students opt to be placed, or not placed, in these classes? If so, how?
- TF7a. Have these classes' "effectiveness" been assessed?
- b. If so, how?
- c. If they have been found to be effective, have efforts been made to expand all-girl and all-boy classes to other teams and grades?
- i. How do different people in the school view this option?
- TF8a. Why has the school chosen to maintain these all-girl and all-boy classes since the 2000-2001 school year?
- TF9a. Describe your all-girl classes and all-boy mathematics classes and ways in which they are similar and different from each other.
- b. Describe your all-girl classes and all-boy language arts classes and ways in which they are similar and different from each other.
- c. Describe how you treat the female and male students similarly/differently in these classes.
- TF10a. Are there specific actions you use in one class that you do not use, or use to a greater/lesser extent, than in the other class?
- b. If so, what are these approaches and why were these decisions made?
- c. If not, why not?
- TF11a. Are there certain teaching methods that you've found to be more effective when teaching girls? Boys?
- b. If so, what are these methods and why were these decisions made?
- TF12a. Do you think the single-gender science classes would be different, or stay the same, if they were taught by a male? Why or why not?

b. If you do think class would be different, how do you think it would be different?

TF13a. What do you envision many of your students doing in the future?

b. Are your responses different for girls and boys? Why or why not?

TF14a. What words come to mind when you think of “man”?

TF15a. What words come to mind when you think of “woman”?

TF16a. What words come to mind when you think of “scientist”?

TF17a. What words come to mind when you think of “science class”?

TF18a. On the recordings, I hear a lot of students use “gay” and wasn’t sure how they were using it. What do you think they mean by the word “gay?” Why and when do they use it?

TF19a. I read the “course description” for the elective “Tomorrow’s Young Men and Women” and had some questions about this course. How many years has it been taught?

b. Did Ms. Small create it?

c. What is the course about?

d. It seems that there are different objectives for the girls and boys in the class [See the footnote that accompanied question A6d]. Can you explain more about that and describe the objectives? Do you know why there are different objectives, or have any ideas as to why there are different objectives?

TF20a. Do you think single-gender classes can over-emphasize gender as the main influence in educational outcomes and possibly overshadow other factors that impact a student’s learning (possibly moreso)?

TF21a. You’ve mentioned that in your experiences, boys tend to be louder than girls. Why do you think this happens?

b. Do the boys or girls talk more in each of the courses you teach – both their on-task contributions and their off-task socializing?

TF22a. Why and when do you send students, individually or the entire class, into the hall?

- b. What do you hope it will accomplish? Does it?
- c. How often has this happened for the boys and girls (both individual students and the entire class)?
 - i. If it's happened more one for class than the other: Why has one class, or one sex of students, been sent into the hall more than the other?

TF23a. What student behaviors strike you as disruptive *to your teaching*? (If the following behaviors are not mentioned, prompt her by asking about the following specific behaviors: drumming, passing notes, mini-skateboards, finger football, and drawing.)

b. What student behaviors strike you as disruptive *to students' learning*? (If the following behaviors are not mentioned, prompt her by asking about the following specific behaviors: drumming, passing notes, mini-skateboards, finger football, and drawing.)

c. What do you do, if anything, to stop these disruptive behaviors from occurring or continuing?

TF24a. In Mrs. Kinsey's room, I see a number of students who seem not to know if a given day is science or social studies and I wonder if they feel that the two classes are similar. Do you think they feel that way in your room – unsure if a given day will focus on mathematics or language arts?

b. Do you think the two courses you teach them – mathematics and language arts – have a similar “feel” to the students?

c. Do you think the students see a stronger difference between disciplines or between teachers?

TF25a. When and why do you give detentions?

b. Do you think they're effective?

c. Have the boys or girls received more thus far, or about the same? Why do you think that's the case?

d. If you don't give detentions, which class, if either, has more behavioral concerns for you? Why do you think that's the case?

Questions for Mrs. Kinsey

TK1a. What is your teaching background and experience?

- b. Why did you become a teacher?
 - c. How long have you been teaching science? Middle school? This curriculum? All-girl and/or all-boy classes? Coed classes?
 - d. What other subjects, if any, have you taught? Where? For how long?
 - e. Which of these institutions had all-girl or all-boy classes? Which of these institutions were public schools?
 - f. What aspect(s) of interacting with this current age group most appeals to you?
- TK2a. What is your science background?
- TK3a. What training, if any, did you receive concerning ways to best teach girls and boys based on their sex?
- b. Describe how your pre-service training prepared you to teach girls and boys together and separately.
 - c. Describe how professional development experiences prepared you to teach girls and boys together and separately.
- TK4a. Why did the school decide to have all-girl and all-boy classes?
- TK5a. Were you interested in teaching all-girl and all-boy classes? Why or why not?
- b. What led you to accept this substitute teaching position with the all-girl and all-boy classes?
- TK6a. Why does only one team contain all-girl and all-boy classes?
- TK7a. How is it determined which students will be placed into the team with the all-girl and all-boy classes?
- b. Can parents/guardians opt to have their child(ren) placed, or not placed, in these classes? If so, how?
 - c. Can students opt to be placed, or not placed, in these classes? If so, how?
- TK8a. Have these classes' "effectiveness" been assessed?

b. If so, how?

c. If they have been found to be effective, have efforts been made to expand all-girl and all-boy classes to other teams and grades?

i. How do different people in the school view this option?

TK9a. Why has the school chosen to maintain these all-girl and all-boy classes since the 2000-2001 school year?

TK10a. If a new student were going to first join your science class next week, how would you describe the class to her/him?

b. In what ways, if any, would your answer change if the student were joining the all-girl class or the all-boy class?

i. What's a typical class period like?

ii. What are the rules you have in science class?

iii. What typical routines are followed in class (such as for handing in homework, working in groups, or participating in discussions)?

iv. What kind of activities do you do?

v. What stories might people in the class repeat that might be unfamiliar to this student?

TK11a. What do you want students to learn in your science class?

b. Do you have unique learning goals for the girls or boys? If so, what are they?

c. How do you hope students will use, in the future, what they learned from your science class?

TK12a. What do you envision many of your students doing in the future?

b. Are your responses different for girls and boys? Why or why not?

TK13a. Describe your all-girl science class and all-boy science class and ways in which they are similar and different from each other.

b. Describe how you treat the female and male students similarly/differently.

TK14a. Are there specific actions you use in one science class that you do not use, or use to a greater/lesser extent, than in the other science class?

b. If so, what are these approaches and why were these decisions made?

c. If not, why not?

TK15a. Are there certain teaching methods that you have found to be more effective when teaching science content to girls? To boys?

b. If so, what are these methods and why were these decisions made?

TK16a. What words come to mind when you think of “man”?

TK17a. What words come to mind when you think of “woman”?

TK18a. What words come to mind when you think of “scientist”?

TK19a. What words come to mind when you think of “science class”?

TK20a. I read the “course description” for the elective “Tomorrow’s Young Men and Women” and had some questions about this course. How many years has it been taught?

b. Did Ms. Small create it?

c. What is the course about?

d. It seems that there are different objectives for the girls and boys in the class [See the footnote that accompanied question A6d]. Can you explain more about that and describe the objectives? Do you know why there are different objectives, or have any ideas as to why there are different objectives?

TK21a. Towards the end of the last interview, you expressed some concerns about the single-gender classes and said, “What happens to the kids that fall inbetween the cracks that don’t stereotypically learn like a boy or like a girl? They’re being forced into a girl class but don’t learn that way” (Mrs.K1_09.27.mp4, 1:28:00-1:28:12). Can you say more about what you meant?

b. Looking at your class lists, are there specific students who you think might be “fall[ing] inbetween the cracks” in science class?

TK22a. Do you think single-gender classes can over-emphasize gender as the main influence in educational outcomes and possibly overshadow other factors that impact a student's learning (possibly moreso)?

TK23a. Now that you've taught these all-boy and all-girl classes for about ____ weeks, since September 6th or so, what are your impressions of these environments for learning? Specifically for science learning? [*This question was asked at different points in the marking quarter and again when she and I spoke by phone later in the school year.*]

b. [*At the end of the marking period, I slightly changed the question to highlight that she had completed a marking period and asked the following:*] Now that you've taught these all-boy and all-girl classes for an entire marking period, what are your impressions of these environments for learning? Specifically for science learning?

TK24a. If you could choose to be a member of a single-gender team or a coed team, which would you choose and why?

TK25a. Describe your teaching style.

b. Describe how you are similar and different from Mrs. Frost in terms of teaching style.

TK26a. Describe the ideal colleagues you would like to work with on an academic team that is responsible for teaching the same group of students.

TK27a. Do the students prefer working alone or with others?

b. Do the boys' and girls' preferences for working alone or with others differ? If so, in what ways do their preferences differ?

c. When and why do you want them working in groups (e.g., for the blob activity) and when alone (e.g., for the "Reading Guide")?

d. When and why do you change their partners? How are the partners determined?

TK28a. You've mentioned that in your experiences, boys tend to be louder than girls. Why do you think this happens?

b. Do the boys or girls talk more in science class – both their on-task contributions and their off-task socializing?

TK29a. Do you think the single-gender science classes would be different, or stay the same, if they were taught by a male? Why or why not?

b. If you do think class would be different, how do you think it would be different?

TK30a. You've mentioned wanting to be done with here and have your own classroom. Why exactly?

TK31a. How confident have you felt with the science material you've been asked to present to these students?

TK32. On the recordings, I hear a lot of students use several words repeatedly that might have different meanings to various people saying and hearing them. I wanted to mention some of these words and ask you what you think students often mean when they say each of them.

a. What do you think they mean by the word "gay?" Why and when do they use it?

b. What do you think they mean by the word "lesbian?" Why and when do they use it?

c. What do you think they mean by the word "retard?" Why and when do they use it?

d. Which of these words (gay, lesbian, and retard) is the "worst" word to use – according to you and according to the students?

TK33a. When do you call on someone who does not have his/her hand raised?

b. Does it differ in the two classes?

TK34a. What student behaviors strike you as disruptive *to your teaching*? (If the following behaviors are not mentioned, prompt her by asking about the following specific behaviors: drumming, passing notes, mini-skateboards, finger football, and drawing.)

b. What student behaviors strike you as disruptive *to students' learning*? (If the following behaviors are not mentioned, prompt her by asking about the following specific behaviors: drumming, passing notes, mini-skateboards, finger football, and drawing.)

c. What do you do, if anything, to stop these disruptive behaviors from occurring or continuing?

TK35a. Why and when do you send students, individually or the entire class, into the hall?

b. Why and when do you tell students, individually or the entire class, to place their heads down?

c. What do you hope these actions will accomplish? Do they?

d. How often have boys and girls (both individual students and the entire class) had to do these actions?

i. If it's happened more one for class than the other: Why has one class, or one sex of students, been sent into the hall, or had to place their heads down, more than the other?

TK36a. When students finish tests, quizzes, or taking notes, I've seen you tell them to put their heads down and take naps. Why do you encourage that?

TK37a. When and why do you give detentions?

b. Do you think they're effective?

c. Have the boys or girls received more thus far, or about the same? Why do you think that's the case?

TK38a. Yesterday you told students to call home during the middle of class if they were not behaving in certain ways. This seemed like a new approach on your part. Is it?

b. If it is a new approach, describe why you're trying something new.

c. Describe the reason for this approach.

d. When will you have them call home (i.e., What must they do in order to be told to call home?)?

TK39a. I see a number of students who seem not to know if a given day is science or social studies and I wonder if they feel that the two classes are similar. Do you think they feel that way?

b. Do you think those two classes have a similar "feel"?

c. Do you think the students see a stronger difference between disciplines or between teachers?

TK40a. What have the students been learning in science this marking period?

b. Why have they been learning this content? (Possible prompt: Is it important for them to study this material?)

TK41a. What makes something a quiz in science? What makes it a test?

TK42a. Why and when do you use the microphone?

b. Do you think the students like it? Why or why not?

c. Do you like it? Why or why not?

TK43a. Describe yourself as a seventh grader.

TK44a. Have you heard anything about gender differences in science? Or science education?

TK45. Mrs. Frost said the following:

“The girls’ class is very often like watching thirty little secretaries get busy, get ready for the day. You know they’re just ready. And they can work quietly...There’s that attitude that, ‘Okay, I’m here and I’m ready to work and I know how to be quiet and I can get to it’” (Mrs.F1_10.01.mp4, 42:06-44:31).

a. Do you agree with these comments and their characterizations of the all-girl class?

b. How would you describe the all-girl class?

c. How would you describe the all-boy class?

TK46a. How do you try to motivate students?

TK47a. Do you try to have the same norms, rules, and expectations for the boys and girls?

b. Do you think anything should differ between the classes? Why or why not? If you do think things should differ, what things and how should they differ?

Questions for students

S1a. Rate yourself in science on a 1-7 scale, with 7 being the best. Explain why you gave yourself that rating.

S2a. Describe any science activities you do outside of school.

S3a. What would you like to do when you grow up and finish school?

- b. How do you think science class can help you in that job/goal?
- S4a. What reasons were you given for why all-girl/all-boy classes exist at your school?
- S5a. Why do you think the school decided to have all-girl/all-boy classes?
- b. Did your teachers or other adults at the school tell you why these classes were at the school? If so, what did they tell you?
- S6a. Why do you think only one team contain all-girl/all-boy classes?
- S7a. Why are you in a science class with only girls/boys?
- b. Was this your choice? Your parents'/guardians' choice? What were the reasons for you being in an all-girl/boy class?
- c. At the start of this school year, did you want to be in an all-girl/boy science class?
- S8a. Describe how you feel about being in the all-girl/all-boy classes.
- b. Do you prefer being in an all-girl/all-boy science class this year?
- c. If you could choose your science class next year, would you prefer to be in an all-girl/all-boy class, a coed class, or does it not matter?
- S9a. If a new student were going to first join your science class next week, how would you describe the class to her/him?
- b. What's a typical class period like?
- c. What are the rules you have in science class?
- d. What typical routines are followed in class (such as for handing in homework, working in groups, or participating in discussions)?
- e. What kind of activities do you do?
- f. What are rules in the science class that no one talks about?
- g. What stories might people in the class repeat that might be unfamiliar to this student?
- S10a. What do you think your teacher wants you to learn in science class?

- S11a. What do you want to learn in science class?
- S12a. Describe what you typically do to complete homework assignments and prepare for tests in this class.
- b. How long do you spend on homework assignments (each night)?
 - c. How long do you spend studying for tests?
 - d. How do you go about preparing for tests?
- S13a. Describe how you think your science class is similar and different from the other science class (the all-boy/all-girl) taught by this same teacher.
- S14a. Describe how this science class is similar and different from:
- i. other science classes in this grade that have both girls and boys in the same class.
 - ii. other science classes you have had in the past where both girls and boys were together in the same class.
- S15a. What are some things you like about science class and would want to see or do more often?
- S16a. Describe what it's like to be in a science class that only contains girls/boys.
- S17a. How does having boys/girls [members of the "opposite" sex] in class affect your science learning?
- S18a. What words come to mind when you think of "man"?
- S19a. What words come to mind when you think of "woman"?
- S20a. What words come to mind when you think of "scientist"?
- S21a. What words come to mind when you think of "science class"?
- S22a. When, if ever, does Mrs. Kinsey send individual students into the hall?
If it does happen,
- i. how often has this happened in your science class?
 - ii. how do you feel when it happens?

- iii. do you think it “works” in that it brings about some change in the student(s)?
 - b. When, if ever, does Mrs. Kinsey send the entire class into the hall? If it does happen,
 - i. how often has this happened in your science class?
 - ii. how do you feel when it happens?
 - iii. do you think it “works” in that it brings about some change in student(s)?
- S23a. On the recordings, I hear students using some words that might have different definitions depending on who says or hears them. I wanted to say some of these words to you and ask what you think is meant when students say each of them.
 - a. What do you think is meant when students call something or someone “gay?” Why and when do they use it?
 - b. What do you think is meant when students call something or someone “lesbian?” Why and when do they use it?
 - c. What do you think is meant when students call something or someone “retard?” Why and when do they use it?
 - d. Which of these words (gay, lesbian, and retard) is the “worst” word to use – according to the students and according to teachers and other adults at the school?
- S24a. I also have heard a lot of students using the word “drama.” Describe drama and describe drama that has taken place in your science class.
 - b. Does drama exist in both the boys’ class and the girls’ class?
 - i. If it does, is there more drama in one of these classes?
 - ii. If you think there is more drama in one of these classes, why do you think that occurs?
- S25a. Do you prefer working alone or with others in science class?
 - b. Do you think most of the girls/boys prefer to work alone or with others in science?

c. For the other science class Mrs. Kinsey teaches, do you think most of the boys/girls prefer to work alone or with others?

S26a. What's the best thing about having only girls/boys in your science class?

S27a. What's the worst thing about having only girls/boys in your science class?

S28a. What would be the best thing about having boys/girls in your science class?

S29a. What would be the worst thing about having boys/girls in your science class?

S30a. Do you think science class would be different, or stay the same, if you had a male teacher? Why or why not?

b. If you do think class would be different, how do you think it would be different?

S31a. Do you like when Mrs. Kinsey or Mrs. Frost uses the microphone? Why or why not?

S32a. I have not sat in on many of your social studies, mathematics, and language arts classes. To you, which class is most similar to science? Why?

i. Is it similar in the way it is taught?

ii. Is it similar in terms of the stuff (content) that is covered?

APPENDIX C: CODING

This appendix provides an example of how I went from my raw data to specific claims. After this example, I include a list of codes that were used as I reviewed the data.

Example involving constructions that emerged around the topic of lab work

Although I applied a grounded theory approach to this work, I entered the study with an initial interview guide that helped me organize data that was generated and analyses that were performed. This guide led me to create some initial codes, many of which are listed at the end of this appendix. Even at the start of this study, I acknowledged that additional codes and sub-codes would develop as a result of things that emerged during my time at the school and as analyses continued.

Three initial codes were the primary starting point for the specific claims noted in the example that is being discussed. These codes were created prior to data generation and were labeled “B,” “G,” and “SCI.” “B” was used to mark data that related to what boys were like or said to be like (e.g., comments that discussed how boys performed in school, their interests, or their ability to focus during class), “G” marked data related to what girls were like or said to be like, while “SCI” marked things related to science, including comments about science class, scientists, and students’ behaviors and self-rating of themselves in science class.

Reading and listening to participants’ comments during the interviews, I coded specific portions of the interviews with appropriate codes “B,” “G,” and “SCI.” Some portions of the interviews received more than one code. The letter codes were entered as

column headings in an Excel file and an “x” was marked in a separate row for each part of the interview (or later, other data sources) that was denoted with a specific one of these codes. The specific times and comments were then placed in that row under the right-most column where the statements were entered.

I was able to sort the entered data and review all comments that were marked with a given code or combination of codes. As a result, I chose to read all the comments that received both a “B” and “SCI” code to develop a better sense of participants’ statements concerning what it means to be a boy doing science. Similarly, I reviewed those comments that received both a “G” and “SCI” code to see what was said about girls in science. By looking at this data according to these groupings, I believed some ideas might develop concerning who boys and girls are, especially related to what it means to learn science as boys and girls. This information related to my second research question, which read, “What do the cultures of two single-sex classrooms in this one middle school say about who boys and girls are and what it means to learn science as boys and girls?”

After reading and re-reading the sorted data, I felt that many statements revolved around the topic of lab work, specifically students’ comfort, or discomfort, handling science equipment during these activities and statements concerning working alone or in groups, including if they preferred one of these formats over the other or behaviors that tended to occur in each format. As a result, I developed sub-codes to better organize comments along these lines.

The new codes “EQT” and “GRP” were developed, where “EQT” was used for things related to comfort handling science-related equipment or materials while “GRP” was for things related to working alone or in groups. Reviewing the data again, these new

codes were applied and I then sorted and read all the comments that were “B” + “SCI” + “EQT” and those that were “G” + “SCI” + “EQT” and did analogous reviews for data that received the “GRP” code.

Reflecting on these analyses, a few themes emerged that suggested certain claims. These claims involved constructions concerning boys and girls as science learners. For example, constructions included: “boys tend to take over lab work in science class,” “girls are more likely to collaborate during lab work in science class,” “girls more strongly dislike handling science equipment and materials, especially ‘nasty stuff,’” and “boys do not dislike handling science equipment and materials as much as girls.”

As ideas were generated, I re-reviewed additional data sources (e.g., field notes and videos), transcribed some portions that seemed related to these claims, and marked these data with similarly relevant codes. I then entered the appropriate data in the same Excel file. Each row recorded information for a specific piece of generated data that received one or more of these codes. The row contained an “x” in the column for each code that that piece of data had been marked and a description of the data (e.g., specific statements from the field notes or a brief summary of what took place during certain noted times in given video or audio data) was placed in the right-most column in that file.

Using these multiple data sources enabled me to confirm and strengthen claims (i.e., triangulation) and engage in purposeful and selective coding to more fully develop some of the constructions. Additionally, I used all these coded pieces of data to seek evidence that confirmed as well as disconfirmed the developing claims. Some of this data included information that opposed the constructions for boys and girls (e.g., instances where boys collaborated during group work or instances where one or more girls took

over group work during a lab activity). These actions pushed me to see if the constructions were supported by behaviors that were observed in class and helped guard against me seeing only what I expected or, unknown to myself, wanted to see.

As a result, I was able to discuss in this dissertation certain constructions that were voiced for girls and boys, explain what participants seemed to mean by certain statements or terms (i.e., what it means to “take over” lab work), and note instances where or how these constructions were maintained or could be opposed based on behaviors that occurred in class. Data and discussion surrounding the specific constructions noted in this example are explained in more detail in Chapter 7.

Codes (Alphabetical)

The above example shows how some codes led to the development of additional sub-codes and eventual claims that related to my research questions. The list below presents some codes initially used to code different pieces of generated data, including interviews, field notes, and videotaped lessons. Data could be marked with multiple codes and sorted and analyzed as seen in the example discussed above.

AGE = comments about any particular age group, such as middle school students (e.g., why single-sex classes would not work at the elementary school)

B = boyness (i.e., what boys are like (including things such as their performance in school, attention span, or ability to focus), what it means to be a boy, or what the all-boy class is like or suspected to be like)

BACK = information about participants’ background as teachers or administrators and how they came to their current positions

BW = comments about the best or worst things about only having students of their own sex in class, and comments about the best or worst things about having students of the “opposite” sex in class

CONCE = reasons coed classes are worse than single-sex classes

CONSS = single-sex classes are worse than coed classes

CTX = information about the school – including the layout of the building and classroom and things I noticed around the building and classroom – and the surrounding community. It also included demographic information about the student body, faculty, and students in this particular team.

DIF = if or how the single-sex classes have turned out to be similar or different than the participant expected, similar or different than classes the participant had in previous years, similar or different than other teams (or other science classes) in the grade, or how or if other teams label this team, or the students in it.

DR = comments regarding the term “drama”

ELEC = things related to the specific elective Ms. Small initiated and that Mrs. Kinsey taught this year

EQL = single-sex and coed classes are comparable (including comments noting that having the “opposite” sex in class would not affect some variable for them, such as their attention), or if a student says s/he is not sure which setting s/he prefers (e.g., such as if the student says s/he is waiting for her/his year-end grades before making that decision). Comments were also marked as “EQL” if participants said they would not care or mind whether their classes were single-sex or coed next year or this year, regardless of whether or not they noted differences between the two single-sex classes or between single-sex and coed classes.

FUT = what students want to do when they are older. This code is also used for adults’ comments concerning what these, or other students in the district, often do when older.

FUTSS = the future of the single-gender classes/program at the school

G = girlness (i.e., what girls are like (including things such as their performance in school, attention span, or ability to focus), what it means to be a girl, or what the all-girl class is like or suspected to be like)

GLR = comments or events that relates to the terms “gay,” “lesbian,” or “retard.” This code is also used for any comments related to the physical act of sex,

romantic relationships, or behaviors that arise only in the presence of the “opposite” sex or supposedly done for the benefit or reaction of the “opposite” sex.

MF = Descriptions and comments about Mrs. Frost

MK = Descriptions and comments about Mrs. Kinsey

MS = Descriptions and comments about Ms. Small

OS = comments on how or if the “other” sex impacts, or would impact, their learning and classroom experiences

OTHER = things that struck me as interesting that I might want to revisit in the future and distinguish through creating additional codes. Some topics marked with this code include: detentions, comments about parents, statements about the teachers’ use of a microphone, and students’ comments about who their friends are and how they study or complete homework assignments (these comments might also be marked as SCI if the comments discussed science work).

PD = Descriptions and comments about Principal Davis

PED = pedagogically, how teachers should or do teach boys and girls differently

PROCE = reasons coed classes are better than single-sex classes

PROSS = single-sex classes are better than coed classes

RE = why the single-gender classes exist

SCI = things related to science, science class in general, scientists, and students’ performance and self-rating in science class (i.e., rate themselves on a 1-to-7 scale). Also this code is used to mark comments that noted what science activities they did outside of school.

SUB = comments regarding being a long-term substitute, including the support they receive and if or how they are evaluated

SXTR = how or if the sex of the teacher impacts, or might impact, class (e.g., if class would differ with a male teacher)

TM = why only one team has these classes

TNG = training (or lack of training) received for teaching single-gender classes, whether this was through orientations, readings, classes, talks, or other means

WA = word associations (i.e., participants' responses to interview questions that asked them what words come to mind when they think of certain words)

WHO = who is and is not placed in the single-gender classes, who might benefit most/least from them and how students and families learn about this placement

THQ = training for 1st 1st 1st
whether this is a
means

AW = word used to
used from 1st 1st

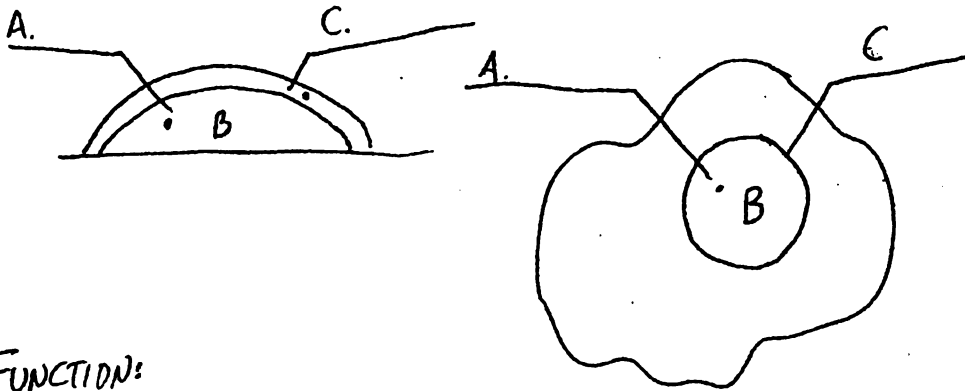
WHO = who is and how
used from 1st 1st
placement

APPENDIX D: EGG DISSECTION WORKSHEET

Handwritten Worksheet

NAME: _____

EGG DISSECTION



FUNCTION:

A. _____

B. _____

C. _____

FIVE LIFE PROCESSES

1.

2.

3.

4.

5.

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