FEMALE STUDENTS' EXPERIENCES OF LEARNING TECHNOLOGY IN SINGLE-GENDER AND MIXED-GENDER SCHOOL SETTINGS

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Female students' experiences of learning technology in single-gender and mixed-gender school settings.

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Abstract

The purpose of this study is to gain insight into a group of female students' experiences learning technology in single-gender and mixed-gender school settings. A qualitative research approach was used. The twelve students participating in this study were selected from an all-female grade 12 *Communications Technology* course. The method of data collection included a questionnaire, a semi-structured interview and focus groups.

This study found that participants' preferred learning technology in the single-gender setting where they described conditions conducive to learning. Participants described receiving more attention, feeling more confident, having fewer distractions, and more control over their learning of the technology. In comparison, participants indicated that they had not adequately learned the technology in the mixed-gender setting, where they described conditions unconducive to learning. They indicated feeling ignored, feeling that they had little confidence and security, and as well as feeling distracted and dominated by males. This study also discusses implications for practice and further research.

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Introduction

1.0 Introduction

Gender equity in education involves the inclusion of the experiences, perceptions, and perspectives of girls and women, as well as boys and men, in all aspects of education (B.C. Ministry of Education, 1998). Some researchers and educators argue that this gender equity is not being achieved in technology use in education today (American Association of University Women (AAUW), 2000; 1998; Lichtman, 1998; National Centre for Educational Statistics (NCES), 2000). According to the Society for the Advancement of Excellence in Education (SAEE) (1997), current education policies that require an equitable education for all students are not being sufficiently explicit on the issue of gender. For example, the Nova Scotia Public School's manual, *Vision For the Integration of Information Technology* (1999) centers on equity in learning technology in general but gender equity in learning technology is not emphasized. This manual states only that teachers must model gender-fair language and listening.

Similarly, in British Columbia's *Ministry of Education Guide* (1998), gender equity in education is discussed in detail. However, equity in learning technology is mentioned only briefly, stating that schools must use gender-specific terms to market opportunities such as technology fairs. Likewise, the United States Department Of Education's National Center For Educational Statistics (NCES) (2000) guide, *Trends in Educational Equity of Girls and Women* concentrates on the importance of gender equity in overall education but again, technology use is mentioned only briefly. Based on these current educational policies, gender equity in learning technology does not appear to be

either a problem or a priority. However, based on current research findings (e.g AAUW, 1998, 2000; NCES, 2000), gender equity when learning technology in education needs to be addressed.

Building on the documented incidents of gender inequities in education, as well as research findings indicating positive outcomes from single-gender education, this study focuses on a particular group of female students' experiences of learning technology in single-gender and mixed-gender school settings with *learning technology* being defined as any instruction pertaining to technology, and any hands-on use of technology in an educational setting. Technology being defined as all computers and computer software and equipment such as scanners etc., as well as multi-media equipment such as video and digital cameras etc. This group of female students attend the same single-gender high school. The group attended five different mixed-gender junior high schools. It should be noted that, at the time of participation, all participants were enrolled in a grade 12 *Communications Technology* course.

This study took a qualitative approach to its methodology and triangulated methods to include questionnaires, semi-structured interviews and a focus group. Female students were asked to describe their experiences of learning technology in both single- and mixed-gender settings. Descriptions of females' experiences with technology included learning technology in single and mixed-gender school settings as well as their comparisons of these settings. The focus of this study is females' technology learning, this technology learning being any technology use related to learning in the school setting. Thus descriptions of participants' experiences were not limited to their use of

technology in technology classes but also included their use of technology overall, in all aspects of their education.

1.1 Statement of the Problem

Claims of gender inequities in education overall (e.g. Orienstein, 1994; Sadker & Sadker, 1973; 1994), and particularly in math, science and technology (e.g. AAUW, 1991; 1994; Kelly, 1988), coupled with the growing trend of technology use, not only in education, but in the current and future workforce (AAUW, 1998; Robertson, 1998), indicate that females may need to be better prepared technologically, so as to compete with males in the new knowledge-based economy.

Gender inequities in education have been documented for decades. An early American study by Sadker and Sadker (1973 as cited in Sadker & Sadker, 1994, p. viii), which studied gender inequities in the classroom, was one of the first to reveal inequalities in education on the basis of gender. This study was in response to the legislation passed in the United States two years previous known as "Title X" which barred exclusion from federally funded programs, such as education, on the basis of sex (Education Week, n.d). Upon the passing of Title X and the findings of Sadker and Sadker, gender equity in education was addressed through means that included inclusion, as well as integration by gender (Streitmatter, 1998). Then, with the introduction of technology into education, it was anticipated that these early inequity problems would be eliminated as technology was viewed as the "...vehicle for overcoming a wide array of inequities" (Neumann, 1991, p.5). However, various research findings now show that technology failed to overcome these inequities and instead brought about inequities of its own (e.g. AAUW, 1994, 1998, 2000; NCES, 2000).

The NCES (2000) states that females make up only a small percentage of students in computer science and computer design courses. As well, females are less likely than males to say that they like and are good at technology, and are less likely than males to exhibit computer confidence and have a positive attitude about computers (AAUW, 1998). Robertson (1998) emphasizes that technology is being implemented into public education in North America at a very rapid rate. The AAUW report, *Gender Gaps* (1998) concludes that, as technology is increasingly integrated into the education system, educators need to ensure that females gain ground and become more involved in technology fields in order for them to achieve economic independence in the boom industries of the 21st century. However, according to some research, females are not gaining this crucial ground (see AAUW, 1998, 2000; Huang, Ring, Toich & Torres, 1998; NCES, 2000; Neumann, 1991). Lichtman observes that the "...low number of woman who take...computer science, who choose computer science as a field of study and who are employed in technology related fields confirms that computer science is far and away a male dominated world" (1998, p.2).

In response to these gender equity issues in education, a small but growing number of advocates for single-gender education are emerging. Meg Milne-Moulton of the National Coalition of Girls' Schools claims that there is resurgence in single-sex education that has been spurred by both popular opinion and hard research that girls are shortchanged in coeducational classrooms (Lehmann-Haupot, 2001). Some authors found that a single-gender classroom can lead to higher self-esteem in females (e.g. Gillibrand, Robinson, Brawn & Osborn, 1999), and that a single-gender setting increases female participation, as well as females' interest in math and science (e.g. Streitmatter, 1997;

Warrington & Younger, 2001). It is important to note that there were no studies identified for this review that investigated whether a single-gender educational setting would have the same positive effects on participation and interest in technology. However, the present increase in the use of technology in education makes such research significant.

Although the academic and emotional benefits of single-gender learning have been highly debated (AAUW, 1998), some research supports the move to single-gender education (Gillibrand et al. 1999; NCES, 2000; Streitmatter, 1997; Warrington & Younger, 2001). Some findings indicate that females are at a disadvantage in a mixed-gender school (e.g. Orienstein, 1994; Sadker & Sadker, 1994), particularly when learning technology (see AAUW, 1998, 2000; NCES, 2000; Nicholson et al.1998; Sadker & Sadker, 1994; Singh, 1993). Other research indicates that females perform better, and feel better about themselves in a single-gender environment (e.g. Gillibrand et al. 1999; NCGS, 2000; Streitmatter, 1997; Warrington & Younger, 2001).

The AAUW 2000 Report, *Tech Savvy: Educating girls in the new computer age*, notes that all future jobs including those in the arts, medicine, law, design, literature and the helping professions will involve technology. Because of this emphasis on technology in the workforce, females may, in many cases, need to be as competent as their male peers in using technology. Although, at present, it is unknown whether a single-gender education will promote this competency, it is viewed by some as an alternative to the "...marginalization...and domination of females in mixed-gender classrooms" (Gillibrand et al. 1999, p.361). Thus, knowledge of the experiences of females who have learned technology in both a mixed-gender and a single-gender school setting may shed light on the challenges and benefits of these two learning settings and help to determine

which setting, if any, this group of females preferred. For this reason, there is a value in investigating females' experiences in learning technology in both settings.

1.2 Purpose

The purpose of this study is to gain insight into a group of female students' experiences learning technology in single-gender and mixed-gender school settings. This study will explore how this particular group of female students described their current experiences in learning technology in a single-gender setting as compared to their previous experiences in learning technology in a mixed-gender setting.

The specific objectives of the research are as follows:

- Identify and describe how a group of female students perceive their experiences of learning technology in their current single-gender school setting.

- Identify and describe how a group of female students perceive their experiences of learning technology in their previous mixed-gender school setting.

- Identify and describe how a group of female students compare their experiences of learning technology in the two different school settings.

1.3 Significance of the Study

This study is significant both practically and theoretically, as little research has been found on females learning technology in a single-gender school environment as compared to a mixed-gender one. Practically, it provides information to policymakers, administrators and educators on the challenges and benefits of females' learning technology in single-gender settings compared to a mixed-gender setting that they may find useful when designing and delivering technology curriculum. Theoretically, this study will add to the growing body of research on single-gender education, and more

significantly, it will shed light on females' experiences of learning technology during a period of increased technology use in education in Canada.

1.4 Limitations of the Study

One limitation of this study is that it examines the experiences of only one group of females who at the time of the study were in enrolled in only one institution, which was a single-gender high school. There was no attempt in this study to look at other females who attended other single-gender high schools. Also limiting this study was the fact that data collection techniques included interviews, questionnaires and focus groups but did not include observations, thus there was no means to determine if participants' descriptions of their experiences matched actual occurrences in the classroom. Therefore, the study is focused on students' perceptions and interpretation of their experiences. As well, this study focuses only on the experiences of female students at the junior high and high school level and made no attempt to study the experiences of female students at the post-secondary level.

Another limitation of this study is that it has students compare their experiences of learning technology at present, to that of the past thus it relies on students' memories of previous events as compared to present events. As it compares present to past, it is limited in that it does not focus on other factors that may have influenced their experiences for example the fact that they were in a different school, a different grade etc.. This study could have taken the approach of examining two different high school settings: mixed-gender and single-gender. However, this design would have resulted in a study of the experiences of two different sets of individuals. This study was interested in gaining insights into one group's experiences of the two different settings. Lastly, the

group of students participating in this study was located at one single-gender high school whereas their mixed-gender experiences included five different junior high schools. However, this study made no attempt to study the variance in past technology use between the five schools. Thus there is no way to determine if students' experiences learning technology at the single-gender setting was in any way influenced by the amount of exposure to technology in which they received in junior high.

1.5 Summary

This chapter began with consideration of the problem of gender inequity in learning, particularly in learning technology in K-12 schools. The chapter presented a brief review of the literature related to gender equity in education in general and specifically related to learning technology. As well, it presented literature on both single- and mixed-gender experiences as well as focusing on technology experiences of females.

The identified purpose of the study was to gain insight into how a group of female students perceive their experiences of learning technology in their single-gender and mixed-gender school settings. It is anticipated that by using the information gained directly from female students' perspectives, policymakers, administration and teachers will gain knowledge they may find useful when designing and delivering technology curriculum. In addition, this study expands on the limited knowledge of female experiences of single- and mixed-gender technology learning in education in Canada.

This chapter presented three research objectives proposed by the researcher to be investigated through the course of the study. These objectives were aimed specifically at how females perceived their experiences of technology learning in their single- and mixed-gender school settings. Finally, the limitations of the study were presented.

The next chapter provides a review of relevant literature in order to explore perspectives central to this study. This includes a review of studies focusing on single-gender education and mixed-gender education respectively, and more importantly, studies specific to learning technology in both of these school settings.

Chapter 2
Review of the Literature

2.0 Introduction

The concept of differences in education on the basis of gender is an area that has been researched in many mixed-gender education settings as well as some single-gender settings. This chapter presents a review of the current research relevant to this study. The areas of prior research presented in this chapter include research conducted in the area of issues of equality in education, factors attributing to inequalities in education, specifically technology, and finally studies that examined the debate on single-gender education. This chapter also describes the contribution that this study will make to the literature on gender issues related to learning technology.

2.1 Gender Inequity in Education

2.1.1 Gender Issues Related to Education in General

More than a quarter century ago, Sadker and Sadker (1973, as cited in Sadker & Sadker, 1994) claimed that gender inequities existed in America's public school system. Their research documented unfair teaching, biased textbooks, and gender-segregated groupings in mixed-gender classrooms. More recently, Sadker and Sadker (1994) found that males and females in the public education system in the United States were still receiving very different educations. Teachers were found to interact with males more frequently, ask them better quality questions, and give them more and better feedback. Meanwhile, "From grade school through graduate school, female students (remained)...invisible..."(p.1).

An earlier study conducted by Kelly (1988) also found that females were disadvantaged in a mixed-gender learning environment. This disadvantage was particularly evident in science, where girls participated far less than their male counterparts. Kelly claimed that this lack of female participation was due to the quantity and quality of teacher-student interaction as male students consistently dominated the teacher's time. Orienstein (1994) investigated female interaction and treatment in two mixed-gender schools and found that females were treated much differently from males. Through her long-term observation and interaction in these mixed-gender schools, Orienstein discovered that teachers interacted differently with males and females. Boys were able to disrupt the class more, dominate teacher time and attention, at the expense of the girls. This study provided evidence of marginalization and oppression of female students in mixed-gender schools. Similarly, Streitmatter (1998) compared a single-gender girls' high school physics class to a mixed-gender class, and found teacher/student behavior similar to that found in past research, with the teacher interacting more with and giving more attention to boys.

A nation-wide poll conducted in the United States by the American Association of University Woman (AAUW) (1991) which involved three thousand nine- to eleven year-old students, found that girls receive an inequitable education both in quantity and quality as compared to boys. This study, titled *Shortchanging Girls, Shortchanging America,* concluded that woman and girls are underrepresented in school curricula, that teaching styles and tests tend to favor boys and that girls lag behind boys in math and science. As well, girls' interest in these subjects was found to decline as they proceeded through school, and even those girls who liked these subjects were only half as likely as boys to

say they were good at them. The most marked gender gap was found in self-esteem, particularly in competence, where females had much lower self-esteem than males and this self-esteem dropped rapidly for females beginning at the middle school level. Boys were almost twice as likely as girls to say they were happy with themselves and that they were good at something. As well, females were much more likely than boys to say that they were not smart enough to achieve their dreams.

2.1.2 Gender Issues Related to Technology Education

The AAUW conducted a follow-up poll in 1998, entitled "Gender Gaps" which met with similar results, as did the AAUW's 1991 study. Although an effort had been made to eliminate gender inequities in education, these still existed. Girls were now taking more math and science classes than in the past, but significant gender inequities had emerged in the area of technology. Here, girls made up only a small percentage of students in computer science and computer design courses and instead were enrolling far more in data entry and clerical courses. Females were also less likely to take higher-level computer science course, less likely to use computers at home, and less likely to enter careers in computer science and other computer-related fields. As well, females exhibited less computer confidence than boys, and less of a positive attitude towards computers.

The NCES study *Trends In Educational Equity of Girls and Woman* (2000) supports the AAUW's findings on females and technology as this study determined that females made up only a small percentage of students in computer science and computer design courses. As well, females were more likely to use computers for word processing than for computer science or design. Also, by grade eight, girls were less likely than males to say that they liked technology, or that they were good at using it.

2.2 Factors Related to Inequities in Learning Technology

Several characteristics may be contributing to this apparent gender deficit in technology education. The AAUW's *Tech Savvy: Educating girls in the new computer age* (2000), reported that girls are not interested in technology in its current form in education today. Current technology classes in public education were perceived by female students as being narrow and technically focused and thus unappealing. As well, it was determined that the culture of computers in education is mostly masculine and does not embrace multiple interests so as to include things that interest girls. Similarly, Huang, Ring, Toich and Torres (1998) concluded that another significant characteristic related to gender inequity in present technology education is the lack of role models in the field of technology. This lack of female role models leads to girls becoming discouraged from using technology as they have few examples to show them that women can be successful in that area. Neumann (1991) stated that stereotypes in computer software and textbooks also contribute to the lack of interest by girls towards technology, as most programs are designed with boys' interests in mind and often reinforce gender bias and stereotypical gender roles.

Another factor that may be contributing to gender inequity when learning technology in education is the attitude of teachers. Huang, et al. (1998) research indicates that teachers feel females are not interested in technology and thus they encourage boys but not girls. Likewise, the AAUW (2000) noted that due to the apparent indifference of females to technology as well as embedded stereotypes, teachers do not encourage girls to use technology. The AAUW (1998) argues that this is due mainly to the lack of skill and knowledge teachers have to create engaging, equitable learning environments for all.

According to this report, teachers lack these skills because they receive little or no training in gender equity from schools of education. According to Sandra Acker (1994) there are various explanations as to why teachers create inequitable learning environments including teacher wariness to feminist ideas, teacher characteristics that resist change, teacher ideology, and teachers' work conditions. Similarly, Gaskell (1989) attributes inequitable teaching practices to a biased, male-oriented curriculum, to teachers reacting to the already gendered behavior of their students, and to teachers' own embedded stereotypes.

A 1998 report by the Northwest Educational Technology Consortium (NETC) concluded that current educational policies do not presently concentrate on establishing gender equity. Policy planners need to gather data from schools to determine the extent of exposure to gender inequities and then provide effective policy plans which acknowledge equity issues and provide implementation strategies to ensure that all students receive equitable standards. As well, such policies should require teacher training and assistance so as to eliminate inequities due to lack of teachers' skills.

2.3 Perspectives on Education in Single-Gender Settings

2.3.1 Research Supporting Education in Single-Gender Settings

Although there is a growing body of research that concentrates on the effects of single-gender education on gender equity, the results are contradictory, with some researchers favoring it (see Gillibrand, Robinson, Brawn & Osborn, 1998; Streitmatter, 1997; 1998; Warrington & Younger, 2001), while others find single-gender education ineffective or unnecessary (see AAUW, 1998; Bennett, Brunner, & Honey, 1999; Kutnick, 1997; Mayer-Smith, Pedretti, & Woodrow, 2000; Manger & Gjestad, 1997).

Warrington and Younger's (2001) study supporting single-gender education investigated the differences between single-gender classes as compared to regular mixed-gender classes. Both males and females indicated that they had more confidence in themselves in the single-gender learning environment (in this case a single-gender classroom in a mixed-gender school) than they had in their regular mixed-gender classes, with girls expressing this confidence much more frequently than boys. In addition, both sexes identified advantages to single-gender classes. For example, girls claimed that they were able to concentrate more without the "usual distraction of noisy, immature boys" (p.346). As well, both sexes felt that it was easier to contribute to oral discussions and to ask questions without being ridiculed, and girls felt they cared about their work more and felt less inhibited in a single-gender classroom. These authors concluded that a "...single-sex learning environment has the potential to counterbalance some of the negative effects of co-educational schooling" (Ibid.,p.353).

In support of these finding, an earlier study that evaluated girls in mixed and single-gender physics classes, found that girls' participation and confidence levels increased in the single-gender learning environment (Gillibrand et al., 1999). According to this study, girls showed a greater willingness to participate in discussions, to seek help, and share ideas in the single-gender classroom. As well, a significant rise in confidence levels was found in girls in the single-gender class as compared to those in the mixed-gender classes.

Streitmatter (1997) investigated the attitudes of girls towards themselves and their classmates in a girls-only 7th - and 8th -grade algebra class. She determined that the girls in the single-gender setting were more likely to ask and answer questions on the subject

matter, and that the girls-only learning environment enhanced their ability to learn math and to view themselves as mathematicians. A more recent study conducted by Streitmatter (1998) which compared single-gender and mixed-gender high-school physics classes revealed that girls in the single-gender class utilized the teacher's time more and became more involved in collaborative learning than did the girls in the mixed-gender physics class. Streitmatter states, "Without the dominance of boys, girls owned the space and the time" (p.5). As well, females in Streitmatter's single-gender class unanimously agreed that they were able to get more work done and received more of the teacher's attention because no boys were present.

Similarly, the National Council of Girls Schools (NCGS) (2000) conducted an alumnae survey that determined numerous benefits for girls attending single-gender schools as compared to those attending co-ed schools. The NCGS alumnae believed that they were better prepared for college than their co-ed graduates, and that girls attending all-girl schools entered college with test scores above average and enrolled in science, technology and math courses at higher rates than the national average.

Concentrating on learning technology in the school setting, Furger (1998) examined ways in which to draw females into computer activity. His study concluded that females prefer nurturing "girls-only" environments where girls are not intimidated by more computer-literate boys. Girls also prefer computer activities that emphasize collaboration rather than competition and prefer activities that are relevant to them. Similarly, Lichtman (1998) found that an all-female technology environment, in this case a computer club, contributed to positive attitudes about technology in females and an increased interest in technology use and in technology-related fields.

Nicholson, Gelpi, Young and Sulzby's (1998) study based on observations of grade-one students working with computers in single- and mixed-gender groups, revealed that girls in the single-gender groupings had more positive experiences working with computers. Females in both groupings gave positive and encouraging comments, while males in both groups gave orders, instructions and created competition. The researchers concluded that this dominant male behavior resulted in females yielding to the competitive language and behavior of the boys, and resulted in a decline in some females' confidence with computers.

Elkjaer (1992) found similar positive aspects to learning technology in a single-gender setting for females. This study concentrated on two mixed-gender computer classes of 14 to 15-year old students in Denmark. Elkjaer discovered that there were two spheres for learning, the public and the private. Male students controlled the public, mixed-gender sphere and females controlled the private, single-gender sphere. Females learned more in the private sphere, once public learning was over and females moved into all-female groups. Here, females helped one another and got help from the teacher, as compared to the mixed-gender, public sphere where boys dominated and females were second for computer time and teacher attention. Elkjaer concluded that there is a "collective repression" in education and society that avoids acknowledging females as competent so as to maintain the current gender image of masculine and feminine and to deny females power and competence in masculine domains.

Fey's (1997) study of on-line collaborations between college and high school students, indicated that the dominant and hierarchical language of males caused some females to back off, withdraw their participation and caused some to be silenced.

Similarly, Singh (1993) investigated the perceptions of grade-five students and their teacher in a mixed-gender setting in regards to computer competence. Findings indicated that boys (with the support of their male teacher) dominated the computers and the classroom. The females felt that they were competent computer users and displayed frustration towards the domination of the males and the teacher's acceptance of this domination. As well, females noted that they experienced a conflict between wanting to please their teacher and their male peers and wanting to be acknowledged for their computer skills.

Another study that identified similar marginalization of females in a mixed-gender technology setting was conducted with high school students in design and technology classes in England. This study by Dixon (1998) concluded that girls in these classes were marginalized and dominated by boys. Girls sat away from the technology equipment and waited for the boys to finish before using it themselves. In this mixed-sex setting, Dixon concluded that females displayed a typical female role of fulfilling others' needs before their own. They acted as if the boys' needs were privileged and their own needs were second. As well, if any females tried to step outside of this passive gender-role and be more aggressive, they were considered abnormal or "weird" by the other students.

2.3.2 Research Questioning Education In Single-Gender Settings

In contrast to these findings, which dispute current mixed-gender education and support single-gender education, other researchers have concluded that single-gender education is unnecessary. In relation to education in general, a study by Manger and Gjestad (1997) that considered the relationship between the ratio of boys to girls in a

third-grade math class to mathematical achievement, determined that classes that had a higher ratio of boys or girls did not affect the achievement of either gender. Thus, a classroom with more girls than boys did not result in girls having higher achievement than a class with more boys. According to researchers, these findings support the established practice of teaching in mixed-gender classes.

A study by Kutnick (1997) examined computer technology use by boys and girls in single-gender or mixed-gender groupings revealed that girls in mixed-gender groups scored higher than girls in single-gender groups. However, the researcher determined that groups receiving social skills training gained the most, and he felt that this indicated that gender was less significant than social skills.

Similarly, in a study by Mayer-Smith, Pedretti, and Woodrow (2000) of whether competence in technology-enriched science classrooms was gender specific, the authors determined that the social organization of the mixed-gender classroom as well as the pedagogical practices could promote successful gender-inclusive technology experiences within the context of a mixed-gender classroom. Bennett, Brunner and Honey's (1999) study of the relationship between gender and technology suggested that the gender problem with technology was over-determined and that technology in the classroom can be successful for both males and females if they are engaged in technology through a multi-faceted, constructivist approach- an approach consisting of a flexible technology environment and no parameters or preset outcomes. A similar study by Bain, Hess, Jones and Berelowitz (1999) that provided evidence that technology could be gender-equitable in a mixed-gender setting was conducted with a total technology immersion program in a high school setting. It was determined that in a setting where the student-computer ratio

was high, participation rates for females increased significantly and the technology skills increased for both sexes.

Because of the contradictory findings of mixed and single-gender learning environments, and because the debate between these two learning environments continues, the AAUW Educational Foundation released a news report in 1998 reported research findings from their study, *Separated by sex: A critical look at single-sex education for girls.* This study included an extensive review of existing literature and research on single-gender education, technology and otherwise. It concluded that, although there was a heightened regard in math and science for girls in single-gender learning environments in some cases, as well as increased confidence and risk-taking, there was "...no evidence in general that single sex education is better for girls than coeducation" (p.1). Although single-gender education seemed to benefit female achievement, much of the existing research was invalid as most single-gender schools were private schools and as such contained highly selective processes for acceptance, and thus hosted females from an upper-class social structure (AAUW, 1998). It was concluded that the longer-term impact of single-gender education on female achievement is unknown and thus further research is needed. Similarly, Streitmatter's (1997) noted that nearly all of the research on single-sex education has adopted a quantitative approach, and as such, has failed to examine variables such as females' sense of confidence, their career aspirations and their sense of marginalization in mixed-gender classes. Streitmatter states, "There is a clear need for more systematic study of what takes place in girls-only classes and how participants feel about such settings" (p.16-17).

2.4 Contribution of the Present Study

A growing number of studies are emerging that evaluate gender equity in education (see AAUW, 1991; 1998; 1998; 2000; Orienstein, 1994; Sadker & Sadker, 1994; Streitmatter, 1997; 1998). However, few appear to evaluate gender equity when learning technology in education. As well, some research focuses on the perceptions of females in coeducational classes versus that of single-gender classes in math and science (see Gillibrand et al.1999; Streitmatter, 1997), but no studies were uncovered for this review that concentrated on such perceptions in technology classes. As well, there were no studies uncovered for this review that evaluated the relationship between single-gender setting and gender equity in learning technology as compared to a mixed-gender setting.

At present, the researcher believes this to be the first study in Nova Scotia to describe females' perceptions of their experiences of technology learning in an all-girls' school environment in contrast to a mixed-gender school environment. As well, it is believed by the researcher, that this is the first study in Nova Scotia, and perhaps Canada, to take place in a public all-girls school, as all research uncovered for the purpose of this study on single-gender schooling had been conducted in private all-girls schools, or single-gender classes in public mixed-gender schools. As well, research uncovered on all-girls schools was conducted in private schools where selective processes are very high whereas this study will be conducted at a public school hosting students with a variety of abilities and backgrounds. Also, the bulk of research deals mainly with the United States, as well as some from Britain and Denmark, with little on single-gender education in

Canada. Thus, this research provides the opportunity to determine if there may be similar findings in a Canadian context.

2.5 Summary

According to the literature reviewed in this chapter on single-gender education overall, and of learning technology in particular, at present, the effects of a single-gender setting on diminishing gender inequities in education are still largely unknown. This chapter discussed research findings on gender inequities in education overall and in learning technology in particular, as well as the factors found to be related to inequities in learning. This chapter also reviewed literature offering perspectives on education in single-gender settings and included research findings supporting learning in this settings, as well as findings questioning the benefits of learning in a single-gender setting. Although some benefits have been found such as increased confidence, self-esteem, and risk-taking, the overall research results are still contradictory.

The growing gender gap in technology, combined with the increase of technology use in education and the possible benefits which some have found single-gender education offers, makes this current study significant. This study anticipates it will add to the growing body of research on single-gender education, and more significantly, it will shed light on single-gender technology learning during a period of increased technology use in education.

The following chapter, Chapter 3, will provide an outline and explanation of the methodology used in this study. The method of participant selection, data collection and data analysis are presented in this chapter.

Chapter 3
Design of the Study

3.0 Introduction

This study aims to gain insight into a group of female students' experiences of learning technology in single-gender school setting as compared to their experiences of mixed-gender learning technology. This study is premised on the assumption that the nature and complexity of this issue are best analyzed through qualitative measures as qualitative research attempts to make sense of personal experiences (Glesne, 1999). As well, this qualitative approach allows for the participants' voices to be heard and for flexibility within the participants' responses enabling further exploration and probing for greater understanding, and adaptation in the setting studied (Glesne, 1999). This chapter will present the context of the study, as well as the methods of participant selection. In addition, this chapter will discuss the method of data collection, and analysis, and issues of validity and reliability.

3.1 Context of the Study

This study was conducted at a girls-only public high school in Sydney, Nova Scotia, a small town located in the eastern part of Nova Scotia, Canada. Participants were drawn from a girls-only, grade 12 *Communications Technology* course consisting of 25 students. This all-girl school is the only all-girl public school of its kind in Nova Scotia. The school houses approximately 400 students. It is important to note that the majority of the females at this girls-only school have come from five mixed-gender junior high

schools, thus this school offers these females their first experience of single-gender education.

3.2 Ethical Considerations

Before any research was conducted, an application was made to Memorial University's Interdisciplinary Committee of Ethics in Human Research (ICEHR) for ethics' approval. Once approval had been granted by the ICHER, an application was made to the Cape Breton-Victoria Regional School Board for permission to conduct research at the single-gender high school. Students interested in participating in the study received a consent form containing research information including the purpose of the research, the requirements of the participant, the method of research as well as participants' confidentiality. It was required that this consent form be read and signed by a parent and the student and then returned to the researcher before the potential participant could become part of the study.

3.3 Participant Selection

The 12 female students participating in this study were selected from all grade 12 *Communications Technology* course at the single-gender high school. The only prerequisites for participating included past experience using technology in the classroom in junior high, as well as having attended a mixed-gender junior high school. This approach resulted in a purposeful research sample representing a variety of experiences in mixed-gender learning environments, as well as a variety of experiences using technology. Having a population with a variety of technology experiences in a previous mixed-gender school provided the researcher with a broad perspective of the experiences

of female students moving from using technology in a mixed-gender environment to using technology in a single-gender one.

The research sample came from an approximate 25 possible participants as any female in the grade 12 *Communications Technology* course could participate assuming they met the prerequisites and pending parental consent. Participants were contacted by the researcher through a verbal introduction and explanation of the study given to students during their *Communications Technology* course (see Appendix A). The researcher then gave any interested students an information and consent form to be signed by the student and their parents. All students who returned the consent forms were given the questionnaire. Students were asked to complete the questionnaire immediately and return it to the researcher.

3.4 Data Collection

Data collection took place in the spring of 2003. Each of the three phases of research incorporated a different data collection technique and built on data collected from the previous phases. The phases of the study were as follows:

<u>Phase One:</u>

Students completed a questionnaire that focused on background information such as their previous educational experiences and previous technology learning (see Appendix B). The questionnaire focused on the present educational experiences of students' learning technology and invited them to compare these experiences with those of their past technology learning. The intent of this phase one was to collect broad data on the topic and obtain background information. Information

gathered in phase one was used to design the questions for the individual interviews in phase two.

Phase Two:

This phase consisted of three individual interviews conducted at the research site. It involved in-depth questioning and probing in relation to information provided in the phase one questionnaire. All interviews were taped and transcribed. Interviewing questions were semi-structured but open-ended so as to allow for probing and clarification as Glesne (1999) states that the interview is an occasion for depth-probes in order to get to the "...bottom of things" (p.87). Participants were encouraged to elaborate on the responses given in their questionnaire. These interviews allowed the researcher to clarify any unknown responses and to probe responses more in-depth to obtain a better understanding of the participants' experiences and perspectives on the topic. As well, the interviews included "member-checking" (Ibid., p.152), which involved reviewing results of the questionnaire and allowing participants to clarify and elaborate so as to ensure accurate representation of ideas. The interview consisted of three stages:

Stage 1:

This stage was intended mainly to make participants comfortable and to establish rapport. Questions during this short stage of the interview overlapped with the questionnaire in phase one (background information, etc.). Participants were asked to clarify and elaborate on the responses given in their questionnaire. As well, this initial stage was intended for member-checking to ensure that the

researcher had properly recorded and understood participants' descriptions of their experiences (see Appendix C).

Stage 2:

This second staged involved more in-depth questioning and probing into answers given on both the questionnaire and answers given in stage one of the interview, as well as including new questions created based on past responses.

Stage 3:

This was the final stage of the interview and was intended for clarification and elaboration. Students were asked to answer new questions based on the results of phase one and stage one and two of the interview. These questions were more structured, in-depth and probing in nature. Some rapport had been established at this point, and participants may have felt comfortable in sharing perceptions and experiences they had not before shared.

Phase Three

This was the final phase of the research, and participants were randomly divided into three groups of four and interviewed as a group. There was repetition in questioning from phases one and two, as well as new questions based on the results of the previous phases (see Appendix D). The purpose of this group interview or focus group, was to allow students to express more than they might when one on one, as Glesne (1999) states that interviewing more than one person at a time can prove very useful especially with children who often need company to be encouraged to talk.

Each phase of data collection concentrated on students' experiences of learning technology in single-gender setting as compared to learning technology in a mixed-gender setting. Questions were semi-structured and open-ended.

3.5 Data Analysis

Preliminary analysis of the data was completed following each stage. For example there was a preliminary analysis conducted of the questionnaires. This analysis served to inform the next stage of data collection which was the interview. When the interviews were complete, the data were transcribed and another preliminary analysis was conducted so as to inform the next stage of the data collection, the focus groups, after which the data were transcribed and a preliminary analysis of the focus groups was conducted. Data resulting from all three data collection methods were subsequently combined for the purpose of analysis. In the second stage, the data were grouped into three categories according to the study's research objectives. The first two objectives were to identify and describe how a group of female students perceive their experiences of learning technology:

1. In their current single-gender school setting; and

2. In their previous mixed-gender school setting.

The third research objective involved identifying and describing how these students compared their experiences of learning technology in the two different settings. These three objectives led to the following categories of data:

1. Single-Gender Technology Setting

2. Mixed-Gender Technology Setting

3. Participants' Comparison of the Two Settings

The creation of the three categories was facilitated by the composition of the research questions, which were also grouped into single-gender experiences, mixed-gender experiences, and a comparison of these experiences. All statements by participants not related to one of these three categories were deleted, as were all comments by the interviewee. One example of the type of comments eliminated is as follows: "I love drama class here at [the school name]; it made me talk out more." In stage three, these data were analyzed a second time in order to focus more specifically on the three main categories and all key statements were grouped together. All quotes related to these key statements were retained. All others were deleted.

The fourth stage involved identifying emerging patterns from among the key statements within each of the three categories by using patterns in key statements and grouping them into sub-categories. For learning technology in the single-gender setting, four sub-categories emerged. For learning technology in the mixed-gender setting, five sub-categories emerged, and for the student comparison of these two settings, four sub-categories emerged.

3.6 Validity and Reliability

Data collection involved a triangulated approach which is defined as the attempt to relate a simple combination of different kinds of data so as to counteract the threats of invalidity identified in each (Berg, 1995, p.5). This research used three phases of data collection, which contributed to the validity in that the "...use of multiple data collection contributes to the trustworthiness of the data" (Glesne, 1999, p.5). In order to ensure validity, data gathered in the first phase, the questionnaire phase, was used as the basis for the questions presented in the second phase of the study, the individual interview

phase. In doing this, the researcher used information collected in the first phase to inform the second phase of the study. The researcher then used data derived in the first two phases as the source upon which to base questions for the focus group in the third phase and as a guide to allow this third phase to probe deeper and allow the further development of understandings into participants' insights. As well, the member-checking in Phase two supported the validity of the research as it ensured representation of ideas.

3.7 Summary

This chapter discussed the methods of data collection used in this study. This study took place at a girls-only public high school in Sydney, N.S. in an all-girls grade 12 *Communications Technology* course. This study employed a purposeful research sample representing a variety of participants with a variety of experiences using technology. Ethics approval had been granted for this study as well as permission from the school board and the school to conduct the research. As well, all participants and their parents were required to complete a form of consent before participating in the study.

Data were collected with three methods. These methods included:

1. Questionnaire

2. Individual Interviews

3. Focus Group

Data were analyzed in five stages. These stages included:

1. Preliminary analysis of each data collection stage and transcription of all taped comments.

2. Grouping data into three categories according to study's research objectives: 1. Single-Gender Technology Setting, 2. Mixed-Gender Technology Setting, 3. Participants' comparison of the two settings.

3. Data were analyzed a second time and key statements were grouped together.

4. Emerging patterns were identified from key statements from each of the three categories and sub-categories were created.

5. Main aspects of each of the three categories were identified from the patterns between sub-categories.

Validity and reliability were established through the concentration on students' perceptions and interpretations, as well as through having each phase of collection built upon the results of the previous phase. As well, further validity and reliability were established through the process of member-checking to ensure the proper representation of ideas. The following chapter, Chapter Four, presents a synthesis of the findings obtained through these processes of data collection and analysis.

Chapter 4
Presentation of the Findings

4.0 Introduction

The purpose of this chapter is to present a synthesis of the findings obtained through the processes of data collection and analysis of questionnaires, individual interviews and focus groups, structured according to three research objectives:

1. Identify and describe how a group of female students perceive their experiences of learning technology in their current single-gender school setting.

2. Identify and describe how a group of female students perceive their experiences of learning technology in their previous mixed-gender school setting.

3. Identify and describe how a group of female students compare their experiences of learning technology in the two different settings.

Analysis of the text representing the entire set of data collected from all three sources led to the creation of categories for each of the research objectives. These three categories are: 1) Single-Gender Technology Setting; 2) Mixed-Gender Technology Setting; and 3) Participants' Comparison of the Two Settings. For each of these three categories, sub-categories were derived based on the identification of patterns in key statements. Four sub-categories were derived from the research for the single-gender technology setting, five sub-categories were derived from the research for the mixed-gender setting, and four sub-categories were derived from the participants' comparisons of the two settings. The categories and sub-categories are displayed in the table below:

Table 4.0 The Three Categories And Their Sub-Categories

Single-Gender Technology Setting	Mixed-Gender Technology Setting	Participants' Comparison of the Two Technology Settings
Individual Attention	Lack of Attention	Attention
Confidence	Lack of Confidence	Confidence
Learning	Lack of Learning	Learning
	Distractions	Distractions
	Lack of Control	

This chapter presents a synthesis of the statements related to categories and their sub-categories. For instance, all the statements relevant to learning technology in a single-gender setting are presented in the first category, and any statements related to attention in the single-gender setting are under the sub-category *Individual Attention*. The data for each sub-category were derived based on the identification of patterns in key statements. For example, the category of *Individual Attention* includes quotations in which the following statements appeared: *It's individual attention; Teachers really help you; You can have a personal connection;* and *You get the help you need.*

The titles of sub-categories within each category were chosen due to their ability to represent as many types of statements as possible within the category. As such, the titles are not absolute in that other similar words may have been chosen. For example, instead of using the title "Individual Attention" for the first category, "Encouragement" could have been used. As well, similarities may exist between the content of some sub-categories. For example, similar statements may exist within sub-categories or some of the statements could be grouped into a possible two different sub-categories. Actual

quotations from the questionnaires, interviews and focus groups are used so as to give direct insight into participants' perceptions and experiences of using technology in the two types of technology settings and how these participants compared these settings.

The study involved only female participants. In order to avoid compromising the confidentiality of participants, no names were used, and participants were referred to only as participants, students or females. As well, to further preserve the anonymity of the participants as well as their teachers, brackets and pseudonyms were used to replace the actual names of teachers spoken of by the participants as well as actual school names.

In the following sections of chapter four, each category and each of their subsequent sub-categories are presented one at a time. These sections present a synthesis of the statements for each sub-category as they were extracted from the five phases of data reduction and analysis. In addition to a synthesis for each sub-category, each category and its subsequent sub-categories are elaborated upon in the text that follows so as to lend further insight and clarity into the participants' experiences and perceptions.

4.1 Single-Gender Technology Setting.

This section provides results of the responses derived from questionnaires, interviews, and focus groups relating to the following research objective: *Identify and describe how a group of female students perceive their experiences of learning technology in their current single-gender school setting.* Participants' responses were grouped into three sub-categories of category one (Single-Gender Technology Setting):

    i.   Individual Attention
    ii.   Confidence
    iii. Learning

The content of each sub-category of the category, "Single-Gender Technology Setting" is synthesized below in individual tables as well as text. The first sub-category *Individual Attention* is as follows:

Table 4.1.1   Synthesis of the sub-category *Individual Attention*

Individual Attention
It's individual attention as well but you do get your questions answered.
You're looked at as an individual.
They [teachers] put more attention on you as a student.
If I was [sic] having trouble he'd [the teacher] tell you to come back whenever you wanted...
They [teachers] don't just pay attention to the whole class; they pay attention to you individually.
Females are given the attention they deserve.
I know the teachers are going to have time to answer my questions.
They [teachers] actually, like, encouraged us to use technology.
It has teachers who will really help you.
If you have a question, he [the teacher] may take a while to come around and answer you but he will answer the question.
It's a smaller school too, and female dominated. You can have a personal connection with the teacher.
The teachers are there. They try to include everybody.
There's more one on one.
They [teachers] have so much time for students.
The environment, it's just wicked! They [the teachers] have so much time for students. There's nothing to worry about.
You're encouraged here.
I find the teacher really pays attention to the student as an individual.
...You have friends here that can help.
If you have trouble he'll [the teacher] eventually get to you or your friend or someone always caught on, and they just showed you.
It [teacher attention] is pretty much equal [for all students].

The sub-category *Individual Attention* groups experiences described by participants that relate to teacher/student interactions and student/student interactions and to key statements such as: *Teachers who will really help you; You're encouraged here; They pay attention to you individually;* and *There's more one on one.*

Some participants indicated an appreciation for being listened to, being given attention, and being helped when needed. Participants expressed their satisfaction with the attention they received by the teachers in the single-gender technology setting. One participant stated, "Females are given the attention they deserve." This appreciation for teacher attention was also discussed in terms of participants receiving individual attention from the teachers:

> You're looked at as an individual. They [the teachers] look at your individual work and not at the whole class, or where the whole class should be. So if someone is not so good at computers, he'll [the teacher] look at that and see how much you've improved.

Another student spoke of her appreciation at being given individual attention in the single-gender setting: "There's more help and resources there. They [teachers] don't just pay attention to the whole class; they pay attention to you individually."

The importance of participants receiving help when it was needed was also discussed. One student expressed her satisfaction with the teacher assistance she received as she stated, "If I was [sic] having trouble he'd [the teacher] tell you to come back whenever you wanted or he would actually sit there with you and be with you the whole class if you needed to." Another student remarked that the single-gender setting "...has teachers who will really help you." As well, another student indicated that she also got the help she needed in the single-gender setting, even if she had to wait for it, "If you have trouble he'll [the teacher] eventually get to you." This student went on to say, "Your friend or someone always caught on and they just showed you." Others also mentioned receiving more help from peers in the single-gender setting. One such student described her experience with peer assistance:

I prefer single-gender because if you have someone next to you, you're more apt to get the same gender to help you if the teacher isn't able to help you at that moment. You're really not used to guys. You have friends here that can help.

Participants also remarked that the teacher had more time for them in the single-gender technology setting. One participant discussed how this additional teacher time helped to alleviate her worrying: "They [teachers] have so much time for students. There's nothing to worry about." Another remarked, "I know the teachers are going to have time to answer my questions. They're not going to laugh at me." Similarly, some participants indicated that they felt they received individual attention and they were encouraged to use technology there. However, one student found no difference in teacher attention between the two technology settings. She indicated that she felt the teachers' time and attention were the same in the single-gender technology setting as in her previous mixed-gender technology setting: "It [teacher attention] was pretty much equal. They [the teachers] didn't do any more or any less [with females]."

Table 4.1.2   Synthesis of the sub-category *Confidence.*

Confidence
I feel more confident here because I am not scared to speak out in class.
...I feel more myself around others of my own gender.
You don't have to worry about the way you look...because girls don't really judge you that much. Not as much as guys do.
They're [girls] not afraid to ask questions. They're not afraid to do a presentation on whatever they feel like. People won't laugh at them and they know that.
You're not embarrassed to ask questions.
People will not criticize if you want to try something new and different.
There's no one here to impress or anything like that so you can just be what you want to be.
It's beneficial because the girls just open up here. They're not afraid of the guys.
It's smaller classes. You get more attention. So you're not afraid to ask questions so you learn more that way. It's just better.
...When you're around all girls every day, I think that's the reason you come out of your shell. You just become really comfortable in your setting.
Everyone is themselves [sic]. No one really has a mask on or anything like that. It's out

in the open.
I don't feel awkward if I am behind everybody else because if I have a question I'll just ask...
I just don't care what anyone thinks of me here. We're all the same. We're all girls. We don't care.
I feel more confident here because the girls-they don't pick on you, they don't care.
I am not afraid to get up in front of anyone now. I'd get up in front of the guys now. I don't care. It really builds my confidence up here.
At [school name], I am much more of a "risk taker" with new programs. I sit down and teach myself how to use it and what button does what.
Coming here just makes us confident in our own skin so when we go to university and there are males there it won't faze us.
I am more confident. It's a different atmosphere-- all girls. I feel more relaxed.
I am more confident here to take risks.
You feel a bit more free to talk about it because...there are no boys.
We are not afraid to ask questions, so we learn more.
Maybe because we are not all so scared to learn it [technology], you actually will try and make the mistakes and learn from them.
I don't think it would make much difference. I'd try whether I'm in a mixed-gender or not.
People are more likely to be creative when they know that no one is going to criticize or ridicule them.
I am not scared to speak out in class.
For me personally, it doesn't make a difference in a single-gender school or not...I am more confident because I have more knowledge.
No one there you would feel stupid in front of...
They [girls] are not afraid to learn new things...
I don't really find too much of a difference in my risk-taking [in SG].

The sub-category *Confidence* regroups statements that relate to security and personal growth in the single-gender technology setting. Key statements such as: *I feel more confident; They're not afraid to ask questions; You're not embarrassed;* and *You can just be what you want to be* were included. *Confidence* was chosen as the title for the category because it best represents the relationship between the key statements. As well, this title represents the feelings of competence that participants perceive they experience when using technology in a single-gender setting.

In terms of security, some participants shared a common perception of being more comfortable in a single-gender technology setting. One participant described her interpretation of why she felt more confident: "For a teenage girl, it's difficult to be more comfortable with yourself. So when you're around all girls every day, I think that's the reason you come out of your shell. You just become really comfortable in your setting..." Another participant commented on how this setting helped her to be herself: "I prefer the single-gender school because I feel more myself around others of my own gender." This perception that students can be themselves in the single-gender setting was shared by another who commented, "You can just be you. There's no one here to impress or anything like that. So you can just be what you want to be."

Participants also described feeling the single-gender setting was safe and secure. One such student portrayed this sense of security when she stated, "People will not criticize you if you want to try something new and different." Other participants indicated that they felt better able to speak out and participate in a single-gender setting due to feeling more "free": "Because everybody else isn't afraid to do their thing then I discuss stuff with other students. You feel a bit more free to talk about it because they're not afraid to talk about it because there are no boys." This same student found, "It's a change...it's beneficial because the girls just open up here. They're not afraid of the guys." Similarly, one student attributed learning more due to not being afraid: "We are not afraid to ask questions, so we learn more."

As well, participants spoke of attempting more in their single-gender technology class because they had less fear of making mistakes or being embarrassed. One such participant stated, "Maybe because we are not all so scared to learn it [technology], you

actually will try and make the mistakes and learn from them instead of trying to avoid everything and just not learning it at all." Another student spoke of this lack of fear making her more creative in the single-gender setting: "People are more likely to be creative when they know that no one is going to criticize or ridicule them."

In contrast, a small number of participants felt that their confidence and risk-taking differed little between the single-gender and mixed-gender technology setting. One student stated, "I don't think it would make much difference. I'd try whether I'm in a mixed-gender or not." The other student, when asked to compare her risk-taking when learning technology in the two settings, stated, "I don't really find too much of a difference in my risk-taking [in SG]."

In terms of personal growth, all participants indicated that they experienced some degree of growth in confidence in the single-gender technology setting. One student indicated that she felt this growth was due to having all girls around, "I'm more confident. It's a different atmosphere--all girls. You feel more relaxed." Another student attributed her growth in confidence to her not being afraid in the single-gender class: "I feel more confident here because I am not scared to speak out in class." Another student explained how she perceived this single-gender setting gave her more confidence for the future:

> Coming here just makes us confident in our own skin so when we go out to university and there are males there it won't faze us. If they have something to say about the way we look, we'll be like, "Fine"!

This sense that students would now be more confident in front of males was mentioned by another student who stated, "I am not afraid to get up in front of anyone now. I'd get up in front of the guys now. I don't care. It really builds my confidence up here."

As well, some participants noted that the single-gender technology setting made them confident enough to take more risks in technology as one student commented, "I am more confident here to take risks." And another stated, "At [school name] I am much more of a risk-taker with new programs. I sit down and teach myself how to use it and what button does what. " However, one student who stated that her confidence did increase in the single-gender setting, attributed this increase to knowing more about technology and not to the single-gender setting, "For me personally, it doesn't make a difference in a single-gender school or not. Over the years I have been doing more with it [technology]. Now I am more confident because I have more knowledge."

Table 4.1.3   Synthesis of the sub-category _Learning_.
[MG]= mixed-gender technology setting

Learning
I learned more and had fun.
I know how to navigate around because of what I learned here.
We're all more capable of using it [technology] now.
I believe my ability has increased greatly.
I can use them [computers] a lot more now since I came here.
I only took it [technology] this year and I learned so much.
I find it is a lot of fun using technology and easy too.
I did things with a computer that I never thought I could do.
He [the teacher] just shows you a bunch of different techniques that I never thought I could do on a computer.
It's wicked fun. I have a ball! You learn so much... You do things you're amazed with; you can't wait to go on to the next project!
I know how to navigate around [a computer] because of what I learned here.
I am having fun in this technology class; I can do so much more.
I believe my ability [in technology] has increased greatly.
I can do so much with computers...If I wanted to; I know I could take something with computers and pass it.
Technology is free here. In... [MG] you had to do a Web Page, but here you can put java script etc.
It gives me the ability to try new things.
It's more advanced, in comparison to [MG]... We are doing a lot more things.
Well you learn everything and if you want to further it on into university, you've got the

basics.
We can do whatever we want on whatever we want. If it's something that interests you, you're gonna [sic] work harder on it.
There's so much more we can do.
There are more opportunities for me to grow and learn. There is much more to offer.
Well the females are given the chance to show they are able to use technology.
Since the teachers trusts you with the digital cameras and video cameras, you have a lot more opportunities to do fun things.
You get to make web pages, PowerPoint, use video and many other things.
We are given the basics here and then set free to figure out the program on our own...
He [the teacher] gives us the basics of the program and he lets me explore the programs on my own.
You're more expected to sit there and just play with it, figure it out.
There are many different ways to learn about technology here.
Here you learn from your mistakes and you're more creative because you can do what you want.
You get to choose topics you really like and by doing that you kind of realize who you really are, what you're really interested in.
I'm more able. There's [sic] more opportunities because there are smaller classes and [the teacher] is a very good teacher.
You get more of an understanding of what you enjoy about it...design...video. You learn it all here so all the doors open.
He [the teacher] showed me so many different things and I understand more.
I am here to learn and have fun. There's nothing in the way.

The sub-category of *Learning* regroups statements related to learning computers and technology and being able or capable at a technical level, of using the tools at their disposition and enjoying using these tools. It included key statements such as: *I believe my ability has increased; I learned more here; I am having fun in this technology class;* and *There are more opportunities for me to grow and learn.*

All participants indicated some degree of technological learning. This learning ranged from learning how to use the computer and Internet to using video, music, and programs. One participant's experience is stated as follows:

> Because I was schooled here, it makes a complete difference. I don't have a computer from home, but I know how to navigate around because of what I learned here. It gives me the ability to go and try new things.

Another student found that her ability to use technology had,"...increased greatly." And still another participant commented on how much she had learned, "I never experienced anything like that until I came here, until I took my technology course. He [the teacher] showed me so many different things and I understand more." This same student stated that she preferred the single-gender technology setting because she "...learned more and had fun." This sense of enjoying the technology was connected to the advancement of learning technology for some participants:

> It's [technology class] wicked fun. I have a ball! You learn so much. You do, like, web pages: I made four web pages this year. You do Power Point...He [teacher] just shows you a bunch of different techniques that I never thought I could do on a computer... It's just fun. You're excited about the course because it's funner [sic]. You do things you're amazed with; you can't wait to go on to the next project!

Some participants indicated that they liked using the technology more; therefore, they learned more, and vice-versa: "I'm having fun in this technology class; I can do so much more." As well, one participant felt that the single-gender technology setting removed obstacles from her learning, "I'm here to learn and have fun. There's nothing in the way."

Having more opportunities to use the technology was described as a positive aspect of the single-gender high school technology setting:

> Well, you learn everything and if you want to further it on into university, you've got the basics. You get more of an understanding of what you enjoy about it...design...video...all the doors open. So if you actually want to do that, it is possible.

Another student described the many new experiences and learning she was exposed to: "You get to make web pages, PowerPoint, use video and many other things." As well, some participants expressed their pleasure in being able to use technology independently: "We are given the basics here and then set free to figure out the program on our own, which I enjoy much more." Others expressed satisfaction at being given opportunities to

use the technology: "There are more opportunities for me to grow and learn. There is -much more to offer."

4.2   Mixed-Gender Technology Setting.

This section provides a synthesis of responses derived from the data collection in relation to the following research objective: *Identify and describe a group of female students' perceptions of their experiences of learning technology class in their previous mixed-gender school setting.* Again, sub-categories were derived based on identification of patterns in the key statements. This synthesis resulted in the following five sub-categories of category two (Mixed-Gender Technology Setting):

i.	Lack of Attention
ii.	Lack of Confidence
iii.	Lack of Learning
iv.	Distractions
v.	Lack of Control

The content of each sub-category is synthesized individually in the tables below:

Table 4.2.1 Synthesis of the sub-category *Lack of Attention*.

Lack of Attention
I just felt like I was ignored.
They'd [teachers] would be a little bit more shocked if the guys didn't understand it at first. So then they'd like explain it to them but what we got was "Hold on a second."
I never got any help at all-- with anything.
The attention they [boys] got and the quality they'd have –their work would turn out so much better. They'd get help with everything. It was just really frustrating when our work wasn't even looked at very often.
I found the teachers favored the guys big time. At the end of the year when we had our Web pages due, the teacher chose select few web pages that would go on the school website. I found mostly they were all guys' web pages.
There were more guys in the class so it was assumed they knew more.
Guys seemed more advanced on us [girls] because they got more help and the girls were kind of behind a little.
The teacher favored guys. He always gave them more direction of where to go, and they would always get more help…

If there was something bigger to do they'd assume, "Oh a girl wouldn't know how to do it." So they let the guy do it.
When there was a project to be done the teachers would always automatically choose a guy…They [teachers] didn't even look twice at the girls, they automatically chose the boys.
When they [teachers] were picking students to do stuff like presentations or assemblies in the gym to do technology, they usually picked boys.
At [the school] the boys were the ones the teachers focused on mostly.
They [boys] were more interested in doing things because they were more encouraged, I guess, by the teacher.
They'd [teachers] call upon a girl the same as the guys. It was pretty much the same thing.
The way teachers treated you compared to how they treated the guys: they'd ask you to do more things, put more tasks on you.
The guys got more attention and a better chance learning about a computer than girls did.
We had a guy teacher. He always talked to the guys. He was more chummy with them.
It just seemed like he [the teacher] could talk to them [boys] more than he could talk to us.
The guys were called upon more than the girls.
We [females] were kind of treated the same [as males]. There didn't really seem like a difference.
Because they [teachers] paid more attention to the males, they didn't see that there were actually females in the class that were capable of using a computer.
If you were a girl--you had to have it explained six times over and over. It was like, "I understand! I know what I am doing. I just have this one question. Just answer that question…" They [boys] got their one question answered.
I more or less ask for help and I'd be ignored or, you know, just got the little, "Oh that's an easy thing to do, how come you can't do that?"
They got all the attention because they knew more.
They [girls] just kind of fade into the background because girls are more well behaved than guys.
If I raised my hand and there was [sic] people around, say there was a male on either side of me, they'd probably be helped first, or they'd help a guy first, then help me.
Females just kind of faded into the background.
We got the help we needed, but there were more students so it took longer.
…they [boys] were asked to give examples or…the Smart-board-- I don't think they ever called a girl to use that.
It was just like we [females] weren't really even there.
Because they [boys] always got the attention in the class so the girls just kind of sit there while all the guys get into trouble…
They [girls] just kind of fade into the background because they are more well behaved than guys.
Computer classes… consisted of mainly boys who got all the help from the teacher and better marks for some reason, I still don't quite understand why.
They [boys] always got the help. They always got the best of the help. All the info was right there for them. Without them even asking, the teacher would go down and help them

out and then the girls are just kind of sitting there, "Why can't you help us?"
They'd [teachers] called upon a girl the same as the guys. It was pretty much the same thing.
We [females] were kind of treated the same [as males] There didn't really seem like a difference [in teacher attention.].

The sub-category *Lack of Attention* groups those statements in which participants referred to their teacher/student interactions particularly teacher/male and teacher/female interactions. Key statements included: *I just felt like I was ignored; I never got any help at all with anything; I found the teachers favored the guys;* and *They [boys] always got the best of the help. Lack of Attention* was chosen as the title for the category because it best represents the relationship between the key statements and encompasses the varying degrees of teacher interaction and attention that some of the participants perceived they encountered in a mixed-gender technology setting.

Some participants described teacher interaction and attention as uneven, with boys receiving more attention and help than females. Some complained that they were at a disadvantage. One participant described her experience as follows:

> They'd [teachers] would be a little bit more shocked if the guys didn't understand it at first. So then they'd, like, explain it to them but what we got was "Hold on a second." [They] More helped them build what they needed to know first.

As well, some participants found that the teachers focused more on the males. One such student shared these remarks: " The teacher favored guys. He always gave them more direction of where to go, and they would always get more help. We'd [girls] just be kind of like, there. 'Yo sir! Over here.'" Others commented that their teachers helped males before females. One student felt that a male would be helped before her: "If I raised my hand and there was [sic] people around, say there was a male on either side of me, they'd

probably be helped first, or they'd help a guy first, then help me." One student described

what it was like getting help in her mixed-gender technology class:

> They [boys] always got the help. They always got the best of the help. All the info
> was right there for them. Without them even asking, the teacher would go down
> and help them out and then the girls are just kind of sitting there, 'Why can't you
> help us?'

Some participants also indicated that they felt that the teacher expected less from

the females than the males:

> When we were doing spreadsheets: you were treated like-- if you were a girl--you
> had to have it explained six times over and over. It was like, "I understand! I
> know what I am doing. I just have this one question. Just answer that question,
> don't go through the whole thing…They [boys] got their one question answered.

One participant felt that females were overlooked: "Because they [teachers] paid more

attention to the males, they didn't see that there were actually females in the class that

were capable of using the computers." Other participants described receiving little to no

attention from the teacher: "I just felt like I was ignored." and "Females just kind of

faded into the background" This perceived lack of attention from the teacher resulted in

some feeling left out. One participant found this exclusion impacted on girls' class

participation: "Because they [boys] always got the attention in the class so the girls just

kind of sit there while all the guys get into trouble or whatever…" As well, another

student noted: " They [girls] just kind of fade into the background because they are more

well behaved than guys."

In addition to this perceived exclusion described by some participants, others

expressed confusion at this exclusion: "Computer classes…consisted of mainly boys

who got all the help from the teacher and better marks for some reason. I still don't quite

understand why." One participant indicated that there was little to no difference in

teacher interaction between males and females: "We [females] were kind of treated the same [as males]. There didn't really seem like a difference." As well, another student felt that, in terms of teacher help, everyone received it equally: "They'd [teachers] called upon a girl the same as the guys. It was pretty much the same thing." This same student also stated, "We got the help we needed, but there were more students so it took longer."

Other participants felt that males were given more responsibilities and got to do more tasks, as one participant described in the following quotation:

> When there was a project to be done, the teachers would always automatically choose a guy. For something in the backroom, like to do a project to, like, learn the whiteboard, they picked guys to do it. They didn't even look twice at the girls. They automatically chose the boys.

Another student described her experience as follows:

> Yeah, that's true, they [boys] were asked to give examples or...the Smart-board— I don't think they ever called a girl to use that. We were only allowed to touch it after class. You were allowed to draw a smiley face with the special marker but...he'd [the teacher] never ask us [girls] to do anything.

In contrast, one student commented that she felt that teachers gave females more responsibility, as she shared these comments: "The way teachers treated you compared to how they treated the guys: they'd ask you to do more things, put more tasks upon you." She tried to explain why she felt this imbalance occurred: "It's kind of like you're looked at a little differently. Like, the boys are immature and they went on all these things and the teachers would look at you and say, "Oh the girls *would* be doing their work."

Table 4.2.2 Synthesis of the sub-category *Lack of Confidence.*

Lack of Confidence
I find other girls feel held back when guys are there because they're scared to ask questions or if they do know, they're scared to show they do because other guys might think they are nerds.
You're really afraid to say too much in front of them.
Sometimes if I asked, "What's a tab?" or "How come this isn't working?" it's like, "Oh

that is easy; it's not hard-- all you do is this"…[it made me feel like] I wanted to get out.
You're more scared of what they're [boys] gonna [sic] think so you're more concentrating on what they're thinking instead of what you really want to get done or what you think you should be doing.
You feel that uncomfortablness when you know what they [boys] could be thinking or what they are thinking.
It's like guys are doing these big elaborate looking things and you're just like "O.K.-- I don't want to be here."
It's all related to how the teachers expect the boys to know more. So we [girls] were used to the boys doing all the big stuff. We probably wouldn't even try.
[Girls were] Intimidated and frustrated with it [learning technology] because they probably did try-- or even tried to get some help and even when they did, it just didn't seem to be working.
I might have [raised my hand] depending on how big the problem was…I was worried about how I would be looked upon if I asked a stupid question.
They're trying to impress the guys, they're like, I am going to withdraw [from using technology] because I don't want people to think I'm an idiot."
Even if you know they [boys] weren't joking around, you would just pretend they were… because you didn't want to get embarrassed.
I'd usually wait for someone else to ask the questions or I'd ask someone else.
I'd just sit and do nothing else there. Even if I thought I did it wrong, I wouldn't raise my hand and tell them.
I'd be too scared…of what they'd [boys] think of me: they'd be like, "blah, blah, blah." And make fun of me.
It was bothersome that I had my hand up for a really long time and he would help someone else first…It could be that he just didn't like me…
If I was interested in something totally off topic and I said it out loud and one of the guys would be like, 'Oh my God…blah, blah.' You wouldn't do it.
I was intimidated by guys a lot and if they [teachers] asked a question in class, and if I knew the answer, I wouldn't speak up. I was afraid in case I got it wrong…
I think they were kind of biased towards the females. They were thinking that they didn't know the technology as well.
That's what the teacher probably thought, that the girls would be a little behind but there were guys that didn't know what they were doing on the computers.
I think the teacher thought they [boys] knew more.
It just seemed like they [boys] knew more. I don't know why they would but they were more interested than girls.
You were uncomfortable of what guys might be thinking.

The sub-category *Lack of Confidence* groups all statements relating to self-esteem and fear of inadequacy. Statements include: *You're really afraid to say too much;*

You're more scared of what they're [boys] are gonna [sic] think; You feel that

uncomfortableness; and *You didn't want to get embarrassed. Lack of Confidence* was chosen as the title for this category as it best represents the relationship between key statements and spoke to the self- esteem and confidence issues that some participants experienced when using technology in a mixed-gender school setting.

Some participants described feeling uncomfortable in a mixed-gender setting. Some of these feelings included fearing: "being wrong," or being "teased," feeling: "afraid to say too much," and feeling: "…uncomfortable of what guys might be thinking of you." Other participants perceived these fears impacted on their learning. One participant stated: "I find other girls feel held back when guys are there because they're scared to ask questions or if they do know, they're scared to show they do because other guys might think they are nerds." While this student spoke of the fear of looking too smart, other participants indicated a fear of being wrong: "I was intimidated by guys a lot and if they [teachers] asked a question in class and if I knew the answer, I wouldn't speak up. I was afraid in case I got it wrong [that] the guys would say something so I wouldn't speak out too much."

Another student stated, "I'd usually wait for someone else to ask the question or I'd ask someone else. You think, 'What if the guys think I'm stupid.' Another commented, "I might have [raised my hand] depending on how big the problem was. If the problem wasn't that big, I probably would have tried to figure it out myself…I was worried about how I would be looked upon if I asked a stupid question." Similarly, one student spoke of not asking for help when needed: "I'd just sit and do nothing else there. Even if I thought I did it wrong, I wouldn't raise my hand and tell them." Still another perceived this fear had impacted her learning: "You're more scared of what they're

[boys] gonna [sic] think so you're more concentrating on what they're thinking instead of what you really want to get done or what you think you think you should be doing."

This fear and discomfort was attributed to negative comments made by the males. Some participants expressed how they believed these negative comments impacted on their self-image and their class participation: "If I was interested in something totally off topic and I said it out loud and one of the guys would be like, 'Oh my God…blah, blah.' You wouldn't do it." Another participant indicated when learning technology in junior high, she would not have attempted to do a web page: "I'd be too scared…of what they'd [boys] think of me, they'd be like 'blah, blah, blah', and make fun of me." In the following quotation, a student described her experiences with males:

> It was just joking around most of the time but when you look back on it you're like, "They [boys] actually meant that when they said it" but when you're in junior high you're like, "Oh that's funny." Even if you know they [boys] weren't joking around, you would just pretend they were joking around because you didn't want to get embarrassed.

One participant indicated that she felt this need to impress the males made some females avoid technology: "They're [girls] trying to impress the guys. They're like, 'I am going to withdraw [from technology] 'cause I don't want people to think I'm an idiot. They won't have any respect for me.' Something like that."

In addition, some participants found that teacher expectations and perceived student abilities were different between males and females. One student stated: "I think the teacher thought they [boys] knew more." Another student spoke of teachers thinking girls knew less: "I think they were kind of biased towards the females. They were thinking that they didn't know the technology as well." Another student remarked that the teachers expected less from females: "That's what the teacher probably thought, that the

girls would be a little behind but there were guys that didn't know what they were doing on the computers." Some participants indicated that they, too, felt males knew more about technology. One commented: "It just seemed like they [boys] knew more, I don't know why they would but they were more interested than girls."

Some females indicated that these teacher expectations affected girls' participation: "It's all related to how the teachers expect the boys to know more so we [girls] were used to the boys doing all the big stuff. We probably wouldn't even try." One student described feeling so frustrated by these teacher expectations that she stopped attending class: "With the girls, they [teachers] were just like, 'Oh yeah, you're doing a web page on cats--that's nice.' It's like guys are doing these big elaborate looking things and you're just like, "O.K-- I don't want to be here!"

Table 4.2.3 Synthesis of the sub-category *Lack of Learning*.

Lack of Learning
It [technology] was used very little.
We didn't do a whole lot.
We were not very knowledgeable in the technology department. We didn't do very much.
They [the teachers] showed us how to do stuff. There was never any hands-on. We never did projects.
Technology was very boring. We were not allowed to do very much and we were taught things we already knew.
We mostly did spreadsheets. "Type this up, print it off."
We didn't do very much and didn't receive much time to use the technology.
It [technology learning] was not structured. I did not learn a lot.
We'd write sticky notes-- that's it. We didn't really do anything.
I didn't know how to use computers in [previous school] I knew how to get on the internet. That was basically it.
They [technology lessons] were really confusing because everyone is so young and we didn't know much about computers back then. It was more fun things rather than projects.
All we [girls] wanted to do was look at pictures. It was stupid. I didn't learn anything.
Pretty plain. They never really taught us much.
It wasn't really focused. The computer class was fun.
It [technology use] was stupid. I didn't learn anything. They [teachers] didn't even explain...just "Type this out and you're done."

It was just a fun class.
It [technology use] was very disorganized. Everyone was just kind of running around.
You were told to do this…you had no creativity.
Technology class…was fun. We didn't do any work really.
We didn't get to take pictures. We didn't get to do anything.
[Technology use] boring…because what we were given to do wasn't fun.
We were never really assigned a project. We'd write sticky notes and stuff.
Alls [sic] we did was Web pages.
[Technology] was only used in class. It was not accessible all the time.
You were told what to do [with technology]. No creativity at all.

The sub-category *Lack of Learning* groups those statements in which participants referred to their learning experiences or lack of learning. Key statements include: *It [technology] was used very little; We didn't do a whole lot; Very boring;* and *It [technology use] was not structured.* This title was chosen for the category as it relates to all key statements as well as portraying participants' perceptions of learning technology in a mixed-gender setting.

Some participants indicated that technology class in their mixed-gender school lacked purpose or organization: "It [technology use] was very disorganized. Everyone was just kind of running around." Participants indicated that not much was done in these classes: "We were not very knowledgeable in the technology department. We didn't do very much." Another commented, "We didn't do very much and didn't receive much time to use the technology." Others described learning little from these lessons. One participant stated, "It [technology use] was stupid. I didn't learn anything. They [teachers] didn't even explain…just 'Type this out and you're done.' Another commented, "It [technology use] was not structured. I did not learn a lot."

Others expressed their feelings of disinterest in technology in their past mixed-gender school: "All we [girls] wanted to do was look at pictures. It was stupid. I didn't

learn anything." Another articulated, "Technology was very boring. We were not allowed to do very much and we were taught things we already knew." Several participants remarked that students were not allowed to do much in their mixed-gender technology setting. One such participant noted that there was a lack of freedom when learning technology in her previous mixed-gender setting: "You were told what to do [with technology], no creativity at all." Another participant stated, "We didn't get to take pictures. We didn't get to do anything." While some participants found that learning technology was boring, others found that although it lacked purpose, it was fun: "It wasn't really focused, computer class was fun." Another commented, "They [technology lessons] were really confusing because everyone is so young and we didn't know much about computers back then. It was more fun things rather than projects."

Table 4.2.4 Synthesis of the sub-category *Distractions*.

Distractions
Boys are great but are too much of a distraction. They aren't sensitive towards anything. If you needed help they'd make fun of you.
[Boys] basically goofed off. They fooled around a lot and stuff...You know, some of them were interested in what they were doing and some of them just didn't really care.
Just their [boys] presence is a distraction. Just the way they come across to everybody.
...they [boys] hate school. They don't want to be there. They're mostly just there to goof off. They're doing anything but work.
Some girls are like; "Oh he's cute" or whatever and they are totally paying attention to him instead of paying attention to what they are supposed to be doing.
Guys--it's distracting; they kind of get the heads of everything like sports and everything.
Class clowns. Most of them [boys] were clowning around and just messing around.
It wasn't like I couldn't do it; it was the distraction of boys in class.
They [boys] just don't pay attention.
It [male disruption] kind of affected me in a way-- like my mark and stuff. When I was in [school name]...I was more for the guys too so I never really said anything.
I just found when there were boys, you kind of had to go with the boys. If they weren't doing anything, then I wouldn't do anything.
I was guy crazy. They are more of a distraction. When guys are around, there's more trouble.
They're [boys] the class clowns. Always walking in the halls. So you don't want to pay

attention, you want to look at the boys.
With class clowns, etc., it's distracting, it really is.
You get distracted from boys from your work.
I found guys are hard…they don't pay attention.
They [boys] wouldn't pay attention and you're trying to listen to the teacher and you can't hear a word that they're saying. They're just so disrespectful.
…the teacher usually had to spend more time calming them down… Sometimes it would be like a good twenty minutes to a half an hour before the teacher actually got started to teach.
When you were on the computers at [school name]…you couldn't do things you wanted to do, you had to impress.
The teacher would spend most of the time with bad students trying to calm them down…mostly boys, a few girls, but mostly boys.
The teacher is trying to tell the class what to do and they [boys] are hooping and hollering.
They [boys] were loud, obnoxious, and you couldn't really hear what the teacher was saying and you didn't really get the idea of what you had to do.
They [boys] goofed around a lot and the teacher spent most of the time telling them to stop doing this, stop doing that. So they don't really get time to teach.
They [teachers] spend so much attention on the boys: telling them to stop and taking them out into the hall. So you'd end up just having to sit there trying to do your work.

The sub-category *Distractions* groups all statements in which participants refer to being distracted in the mixed-gender technology class. Key statements include: *Guys-it's distracting; Too much of a distraction; class clowns;* and *They goofed around a lot. Distractions* was chosen as a title for this category as it encompasses the key statements expressed by the participants.

Some participants indicated that having boys in the mixed-gender technology setting was a distraction. To describe this occurrence, participants used statements such as, "Guys, it's distracting," "Class clowns…clowning around and just messing around.", "…they [boys] just don't pay attention.", and "You get distracted from boys from your work." One participant described her experience as follows: "Boys are great but are too much of a distraction. They aren't sensitive towards anything. If you needed help, they'd make fun of you." Another described feeling that just having boys present was a

distraction: "Just their presence is a distraction. Just the way they come across to everybody."

Others discussed how some participants allowed themselves to be distracted from their work: "I just found when there were boys- you just kind of had to go with the boys. If they weren't doing anything, than I wouldn't do anything." Similarly, one student describes how males can distract females, "Some girls are like, 'Oh he's cute' or whatever and they are totally paying attention to him instead of paying attention to what they are supposed to be doing." The desire to impress the males was also described as a distraction for participants. One participant discussed how this need to impress impacted on her learning technology: "When you were on the computers at [school name] you couldn't do things you wanted to do, you had to impress."

Some participants spoke of the distraction of males who did not pay attention: "[Boys] basically goofed off. They fooled around a lot and stuff. They never really-- you know, some of them were interested in what they were doing and some of them just didn't really care." Another commented, "Class clowns. Most of them [boys] were clowning around and messing around." This lack of attentiveness was attributed to boys not wanting to be there: "...they [boys] hate school. They don't want to be there. They're mostly just there to goof off. They're doing anything but work." Some perceived these distractions and disruptions from their learning technology caused them to lose valuable teaching time. One such participant commented, "They [boys] goofed around a lot and the teacher spent most of the time telling them to stop doing this, stop doing that. So they don't really get time to teach." Similarly, another student comments on how time was wasted:

I don't want to stereotype guys but more of them acted out in class. Where the teacher usually had to spend more time calming them down…Sometimes it would be like a good twenty minutes- a half hour before the teacher actually got started to teach.

In addition to the feelings of losing valuable teaching time, others expressed concerns about these disruptions affecting their learning. One participant remarked: "They [boys] were loud, obnoxious, and you couldn't really hear what the teacher was saying and you didn't really get the idea of what you had to do." Another commented that these disruptions affected her mark: "It [male disruption] kind of affected me in a way-- like my mark and stuff. When I was in [MG] I was more for the guys too and stuff so I never really said anything." The loss of teacher time was also an issue for another participant who stated, "…there's a childishness. They [teachers] spend so much attention on the boys: telling them to stop and taking them out into the hall. So you'd end up just having to sit there and trying to do work."

Table 4.2.5 Synthesis of the sub-category *Lack of Control*.

Lack of Control
Boys took over the technology.
It was quite a male dominated activity at [previous school]. I did not get much of a chance there to learn about technology.
Guys took over the class.
The guys would take over the class…
Guys tease, "Of course she knows that answer." And little comments like that.
They [boys] say, "Oh mine's better." Or they're just right picky.
If they (boys) have guy friends they tend to make fun of girls if they do something stupid.
Males also dominate the computers. They think they run the system and know it all.
I think males, for the most part, they like using technology and they usually dominate the technology world.
If they [girls] didn't know a lot about computers, they wouldn't want to [ask questions]. They wouldn't want to be embarrassed by immature boys who would laugh at them.
Sometimes if I asked, "What's a tab?" or "How come this isn't working?" it's like, "Oh that is easy; it's not hard all you do is this"…I wanted to get out [of class].
It [technology] was quite a male dominated activity at [the school name]. I did not get much of a chance there to learn about technology

The sub-category *Lack of Control* encompasses all statements relating to perceptions of males monopolizing technology learning including the teacher, the technology and the students. Key statements include: *Boys took over the technology; It was quite a male dominated activity; Guys took over the class;* and *Males also dominate the computers. Lack Of Control* was chosen for the title as it best represented the key statements and represents the various control challenges female participants perceive they experienced through using technology in a mixed-gender setting.

Some participants expressed dissatisfaction resulting from their lack of control over teacher attention, over the technology, and over the class discussions. Some spoke of males controlling the technology as they commented: "Boys took over the technology in the [MG]...", and "...guys took over the class". Several comments were made concerning males knowing more or acting like they knew more. One participant stated: "Males also dominate the computers. They think that they run the system and know it all."

Male control of teacher time and attention was also perceived as a challenge. One student shared her experience: "The guys would take over the class and the teacher paid more attention to the boys, so I found." One student tried to explain this imbalance in teaching time: "I think males, for the most part, they like using technology and they usually dominate the technology world. So teachers, I think, would have a bias and pay attention to them more so than girls."

Negative comments made aloud in class by males, were also perceived by the female participants as a form of control. Some of these comments included: "Oh that's an easy thing to do, how come you can't do that?", "Oh look at this one", and "Teacher's

pet." One student indicated that these comments impacted her desire to attend technology class: "Sometimes if I asked, "What's a tab?" or "How come this isn't working?" it's like, "Oh that is easy; it's not hard all you do is this"...I wanted to get out [of class]." Some participants indicated that these negative comments impacted on girls' class participation: "If they [girls] didn't know a lot about computers, they wouldn't want to [ask questions]. They wouldn't want to be embarrassed by immature boys who would laugh at them. " One participant found that male domination prevented her from learning: "It [technology] was quite a male dominated activity at [school name]. I did not get much of a chance there to learn about technology."

4.3 Participants' Comparison of the Two Settings.

This section provides findings related to the following research objective: *Identify and describe how a group of female students' compare their experiences of learning technology in the two different school settings: single-gender and mixed-gender.* This section regroups statements that resulted from participants being asked to deliberately compare the two settings. However, some statements of comparison may be included in the other two categories [single-and mixed-gender] because participants, even when they were not asked to compare the two settings, sometimes did so. The data for each subcategory were grouped according to key statements. This grouping resulted in the following four sub-categories of category three (Participants' Comparison of the Two Settings):

    i.   Attention
    ii.   Confidence
   iii.   Learning
   iv.   Distraction

The content of each sub-category is synthesized individually in the tables below:

Table 4.3.1 Synthesis of the sub-category *Attention.*
[SG]= single-gender technology classroom
[MG]= mixed-gender technology classroom.

Attention
Because there are no boys [in SG], there's [sic] not really a lot of people, like, misbehaving and stuff. So teachers have more time to explain stuff to you…
I find I learned a lot more here at [SG]…for the reason that I find the teacher pays more attention to the individual student equally.
I am more patient with waiting because I know I am eventually gonna [sic] get my turn [in SG]. When before [in MG] … It was 'Hold on a second.'…maybe at the end of the day, I may actually get my answer.
More focus is put on each student [in SG] and bigger tasks aren't given to boys.
In [MG]…teachers had a view that males should be more involved in computers than females. Here [SG] girls are open to any course… I couldn't do a simple web page [in MG], 'cause I was not given the help or opportunity.
It's just that people [in SG] help you…with it [technology]. If the teacher's not there you can ask your girlfriend… they'll help you…but guys [in MG] are like, "Whatever, I'm not doing that right now."
I learned a lot at [SG] because I got more personal attention.
I try more things [at SG] because I'm encouraged to.
There's [sic] no guys goofing around [in SG] so the teacher has more time. It's just better.
It's more easier [sic] here [SG] because there's more one on one. The girls here-- if they want help-- they just go to the teacher. Anywhere else [MG] they just stayed quiet.
You learn more [at SG] because the teachers have more time for us. Rather than paying attention to people that are not into it or causing a big scene.
In the [MG], it felt everything was aimed at the males. Whereas here [SG], if a female takes a computer course, they are taught accordingly.
I learned more here [SG] than [MG] because it's more open here… The teacher doesn't single out guys and go help the guys all the time…
The teachers can't just focus on one gender. They can't just focus on males because there's [sic] no males present. Students are all females.
In a [SG] we [girls] have a bigger chance to do more because the boys usually got to do the more "complicated" roles [in MG].
The focus [in SG] is not whether you're a girl or boy but because [sic] you're here to learn. At my other [MG] school there was almost a bias because you were a girl, like technology didn't matter to you.
They [teachers] get us to do so much more [in SG]. It's not just 'Do this.' and that's it. They help us do it. So you get further.
It's [SG] just better. It has teachers who will really help you.
It [teacher attention] was pretty much equal. They [teachers] didn't do any more or any less [with males].
I prefer all girls. It's a lot more personal [than MG].

The category *Attention* groups those statements made by participants that relate to teacher/student interactions and student/student interactions and to key statements such as: *Teachers have more time to explain stuff to you; teacher pays more attention; I got more personal attention;* and *Teacher pays more attention to the individual.*

Some participants commented that teachers paid more attention to them in the single-gender technology setting than their teachers did in the mixed-gender setting. One participant felt that this difference in teacher attention resulted in her learning more: "I find I learned a lot more here at a [SG]… for the reason that I find the teacher pays more attention to the individual student equally." Similarly, another student indicated that she learned a lot more because she "…got more personal attention." One student tried to explain the difference in teacher attention between the two settings. She stated, "In [MG]…teachers had a view that males should be more involved in computers than females." This student went on to say, "Here girls are open to any course. I love computers here. In [MG] I couldn't do a simple web page, cause I was not given help or opportunity." Some described having more opportunities in a single-gender setting. One student stated, "More focus is put on each student [in SG] and bigger tasks aren't given to boys." Another remarked, "In a [SG] we [girls] have a bigger chance to do more because the boys usually got to do the more 'complicated' roles [in MG]."

Getting help when needed was viewed as a challenge in the mixed-gender setting but not in the single-gender one. One participant indicated that getting this help led her to be more patient, "I am more patient with waiting because I know I am eventually gonna [sic] get my turn [in SG]. When before [in MG] it wasn't like that. It was 'Hold on a second.' Then they'd go to another person, then another person and then maybe at the end of the day, I may actually get my answer." As well, several participants felt that peers

were more helpful in the single-gender setting. As one participant explained in the following:

> It's just that people [in SG] help you and stuff with it [technology]. If the teacher's not there you can ask your girlfriend next to you or something and yeah, they'll help you and show you from step 1 to step 10 but guys [in MG] are like "Whatever, I'm not doing that right now."

Participants also articulated that they did not have to contend with the same teacher expectations in the single-gender technology setting as they did their mixed-gender setting. Several indicated that this was a positive difference. One student commented that in the single-gender technology setting, "The focus [in SG] is not whether you're a girl or a boy but because you're here to learn. At my other [MG] school there was almost a bias because you were a girl, like technology didn't matter to you." Another shared these remarks, "In the [MG], it felt like everything was aimed at the males. Whereas here [SG], if a female takes a computer course, they are taught accordingly."

Table 4.3.2 Synthesis of the sub-category *Confidence*.
[SG]=single-gender technology setting
[MG]=mixed-gender technology setting

Confidence
I never tried anything [in MG] because of the fear of being wrong or made fun of. Now [in SG] I do so much with computers and I'm not afraid to ask for help.
It's [SG] more of a comfortable environment. We don't have to compete against guys and we're not afraid to speak up…because guys may think we are too smart…
I'm not afraid for people here [SG] to know who I really am. At other co-ed school I think I'd be kind of held back. I wouldn't want the guys to know who I really am because of being teased and everything.
People aren't afraid to ask questions [in SG] and people aren't afraid to get up and do projects.
Now [in SG] I can do what I want without having to worry about messing up…The boys [in MG] might be like 'Oh you're stupid because you did that wrong.' Whereas here, you can make a mistake and not have to worry about it.
You'd only do certain things… [in MG].You wouldn't feel free to do a project on what you're interested in because you'd be afraid it wasn't good enough or you wouldn't impress them [boys]…

They [girls] are not afraid that anyone will be picked on now because that's just not what it's like here [in SG] and they know that.
When you want to ask questions in class you don't have to worry about anyone laughing at you because no one really does in this... [SG].
No one picks on you here [SG].
You learn from your mistakes here. You're not put down.
No guys to call us down or do anything like that. People here [in SG] are nice, they are not going to say anything to your face. You're not worried about what other people are thinking.
I think it's more personal attention when you're in the [SG] and it's also more comfortable. I don't know, some girls feel they couldn't ask questions in [MG] just because they didn't want to sound stupid.
I'm not worried really, what other people think....With guys you're like, 'What if he thinks I'm stupid?' It's always based on the guys but here [SG] it's totally different.
Here [SG] really brought out who I really am. I'm more outgoing now and more confident now. I'm not afraid to get up in front of people. In [MG] I was always the shy one in the back of the room.
I was picked on a lot in junior high and elementary by guys. So I feel more confident here at [school name] because the girls-- they don't pick on you. They don't care.
...they [girls] don't want the boys [in MG] to think that they're ugly...Where in an all girl school it's more "I'll just go to school, do my work...and not have to worry about all that."
In my...[MG], I would not take any risks at all without talking to the teacher first. Now in a [SG], I have enough confidence in myself to take risks as I wish to.
A lot more confident [in SG]...Now I can go to a program and actually check and find out what each button does. Whereas in...[MG] I would do what was said. I wouldn't venture outside of that bubble.
[I'm] a little more confident. I never really had a problem with that kind of thing but it is easier to work here [SG].
There was [sic] a lot of girls that came here [SG] from my... [MG] and the difference in them is unreal... They were just shy, kind of quiet and to themselves [sic] and now here, they do what they want and they have lots of friends here.
Here [SG] you can ask classmates a question without being embarrassed.
In ...[MG] if you get the answer wrong, guys are like, "Oh you're stupid" or whatever. Girls [in SG] are like 'Good try!' They make you feel good about it.
I am not concerned about the kinds of topics I pick to do my work because I don't think that the girls would pick on me for it where I think the guys [in MG] would.
I just followed the guys [in MG]. Here [SG] I do whatever: I sing, I laugh, and I do whatever I want.
I am more of a risk-taker [in SG]. I do Web pages and video too. Whereas in ...[MG] I'd stick to something extremely easy so I could learn on my own.
I wouldn't say I was less confident in myself [in MG]; I was just less comfortable with my ability to use technology.
I don't think it would make a difference. I'll try whether I'm at a mixed school or not.
We have a final project... I'll probably, maybe try something different like start a web

page and work on a video too. Whereas...[in MG] If given an assignment like that, I would probably stick to something that was extremely easy that basically I could try to learn on my own.
When there's [sic] boys around you got to make sure you're all dressed up and stuff to go to school. Here [in SG] you can wear your pajamas...
It's easier to cope [in SG]. It's not stressful. If you need help, there's [sic] tons of people to help you.
Some people won't be their selves [sic] around guys. They want to be the way the guys want them to be and here [in SG] you can just be yourself and nobody cares.
You are more free to express yourself now [in SG] than before. You are not trying to impress boys so you can express yourself more freely.
Here [in SG] I talk to everyone. If guys were there a girl would be like, 'I can't talk to that girl because she's not cool.'
Guys are more immature ...[in MG]. They [girls] are shy. Here [in SG] they have less to impress.
They [girls] don't have to deal with the stress of having to make themselves look prettier for guys [in SG].

The category *Confidence* groups all statements related to security, self-esteem and self-confidence. Key statements and phrases included: *the fear of being wrong or made fun of; It's [SG] more of a comfortable environment; I'm not afraid for people here to know who I really am;* and *I'm more outgoing now and more confident.* Confidence was chosen as the category title because it best encompasses the key statements and spoke of the perceptions of self-esteem and security in the comparison of the two technology settings.

According to some participants' statements, many found a significant difference in their level of security in a single-gender technology setting as compared to a mixed-gender one. One such participant describes her experience: "I was picked on a lot in junior high and elementary by guys. So I feel more confident here at [school name] because the girls-- they don't pick on you. They don't care." Another shared these remarks: "It's [SG] more of a comfortable environment. We don't have to compete against guys and we're not afraid to speak up in classes because guys may think we are

too smart or something." Another felt the fear of making mistakes was also alleviated in the single-gender setting:

> Now [in SG] I can do what I want without having to worry about messing up my picture or what my image would look like. The boys [in MG] might be like 'Oh you're stupid because you did that wrong.' Whereas here, you can make a mistake and not have to worry about it.

One participant expressed this sense of reprieve from the fear of inadequacy in the single-gender technology setting when she commented, "I'm not worried really, what other people think. She thinks what I think, but with guys you're like, 'What if he thinks I'm stupid?' It's always based on guys but here it's totally different."

Another indicated that she felt more secure learning in the single-gender technology setting as compared to the mixed-gender setting because of the difference between the reaction of males and that of females to student errors, "In [MG] class, if you get the answer wrong, guys are like, "Oh you're stupid" or whatever. Girls [in SG] are like 'Good try!' They make you feel good about it." Similarly, some stated that girls feel more secure learning in the single gender setting because: "No one picks on you here." Similarly, participants articulated that in the single-gender setting they didn't feel the need to impress males, as one student claimed, "When there's [sic] boys around you got to make sure you're all dressed up and stuff to go to school. Here [in SG] you can wear your pajamas or anything you want.."

Because of the perception of security in the single-gender setting, some participants felt their participation level increased. One student describes her personal experience, "I never tried anything [in MG] because of fear of being wrong or made fun of. Now [in SG] I do so much more with computers and I'm not afraid to ask for help." Another commented that learning in the single-gender technology class was, "Definitely

better. People aren't afraid to ask questions [in SG] and people aren't afraid to get up and do projects." Security in choice of project topics also varied in the two settings for one student:

> What I like about [SG]... is that I am not concerned about the kinds of topics I pick to do my work because I don't think that the girls would pick on me for it where I think the guys [in MG] would.

Asking for help was another factor that some participants perceived as a difference between the two technology settings. One student commented, "Here [SG] you can ask classmates a question without being embarrassed." Fear of inadequacy prevented some from asking for help in a mixed-gender technology class, but this was not so in a single-gender class, as described by one participant: "I think it's more personal attention when your in the [SG]...and it's more comfortable. I don't know, some girls feel they couldn't ask questions in [MG]...just because they didn't want to sound stupid." Another stated that getting help when needed was less stressful, "It's easier to cope [in SG]. It's not stressful. If you need help there's [sic] tons of people to help you. You're not embarrassed to ask questions."

In addition to security issues, self-esteem issues also differed between single-gender and mixed-gender technology classes. Some participants indicated that they perceived themselves as more confident in the single-gender technology setting as compared to the mixed-gender one. Others felt this increased confidence was due to not having males present as expressed by one student in the following:

> It [having boys in class] probably makes them really self-conscious because they [girls] don't want the boys to think that they're ugly...where in an all girl school it's more, 'I'll just go to school, do my work and talk to whoever and not have to worry about all that.' You're more confident here.

Another stated, "...I just followed the guys [in MG]. Here [SG] I do whatever: I sing, I laugh and I do whatever I want." Risk-taking was also articulated as differing in the two technology settings. In the following quotation, one student describes this difference in her risk-taking when learning technology in a single-gender setting as compared to a mixed-gender one:

> You can take more risks at something you like and are interested in [at SG], like making a PowerPoint presentation. You'd only do certain things [in MG]...things that were cool. You wouldn't feel free to do a project on what you're interested in because you'd be afraid it wasn't good enough or you wouldn't impress them [boys] or something.

Trying new things with technology was described as a form of risk-taking that existed in the single-gender setting more so than the mixed-gender one, and was attributed to making the participants feel more confident as revealed in the following quotation:

> [I am] A lot more confident [in SG]. My abilities increased a lot on computers. Now I can go to a program and actually check and find out what each button does. Whereas in [MG]...I would do what was said. I wouldn't venture outside of that bubble.

Another shared her experience of being more of a risk-taker when learning in the single-gender technology setting:

> I am more of a risk-taker [in SG]. We have a final project due for exam I'll probably, maybe try something different like start a web page and work on a video too. Whereas...[in MG], if given an assignment like that, I would probably stick to something that was extremely easy that basically I could try to learn on my own.

Some articulated that their confidence increased to some degree. Some felt it increased significantly: "In my...[MG], I would not take any risks at all without talking to the teacher first. Now in a [SG], I have enough confidence in myself to take risks as I wish to." Others felt their confidence increased slightly: "[I'm] a little more confident. I never

really had a problem with that sort of thing but it's easier to work here [SG]." A small number of participants felt their confidence and risk-taking stayed the same: "I wouldn't say I was less confident in myself [in MG], I was just less comfortable with my ability to use technology." The other stated, "I don't think it would make a difference. I'll try whether I'm at a mixed school or not."

Table 4.3.3 Synthesis of the sub-category *Learning*.
[SG]=single-gender technology setting
[MG]=mixed-gender technology setting

Learning
I found I learned more with technology here [at SG] than any other [MG] school because the focus is not whether you're male or female but if you can do it.
I never really even knew how to start a computer...[in MG] and now [in SG] I could just basically do everything that we were taught...
If I had went [sic] to a mixed school, I probably wouldn't have taken computer courses. I probably wouldn't have went [sic] so far in computer studies.
Since I came to [the SG] I had more of a chance to use computers in ways that interest me.
It's more advanced here...[in SG] because in... [MG], we really didn't do much with it [technology].
It's [technology] more advanced [at SG]. We have more of a chance to use the video cameras... we are more encouraged to put a lot of work into it.
I like the [SG]...much better [than MG] because I learned much more at [the school name] than I ever would have at a co-ed school.
I just learn more here [SG] and I want to do more and there's [sic] more options. It's, more fun than ...[MG].
My average in technology is 90 and higher here [SG] and my average in technology there [MG] was 30, 30 to 50.
It's [SG technology] so much more funner [sic]. You do so much more better things. If you enjoy what you do, then you'll get a wicked mark in it.
...I find it's [technology] something I am good at and I would like to pursue it in the future. If I would have went [sic] to a [MG] I probably wouldn't have found that out.
...I know a lot of females in this [SG] school who proved they are capable of using technology. Whereas in... [MG] they probably weren't even given the chance to prove that.
I feel my ability has improved over the years. I make higher marks here [in SG] than I ever did in [MG], including my technology course.
My ability to use technology here [SG] as compared to my previous [MG]...has become a lot stronger because there is [sic] more chances to use the technology available to us.
Using technology at this all-girl school is much more complex [than MG] and we receive

many more chances to use the technology.
In my ...[MG] you didn't really have the opportunity to try something new. At this ...[SG] you have more opportunities to try something new.
Males usually dominated the computer field [in MG]...they were automatically assumed to be geniuses. Whereas here [SG], females are able to shine and show their ability. They are able to prove they are capable of using the technology provided.
I have gotten a little better and a little more comfortable around them [computers][in SG]... I didn't like computers [in MG] I didn't want to be around them at all.
All girls is more comfortable.

The category, *Learning* groups all statements that relate to comparing new technology awareness, technological opportunities, and personal growth, in the two different technology settings. It includes key statements such as: I *learned more with technology here; I had more of a chance to use computers; my ability has improved;* and *more opportunities to try something new.*

Some participants were adamant in describing their growth in the area of technology learning in the single-gender setting as compared to the mixed gender one. They were very vocal in expressing their perceptions of single-gender technology use resulting in growth. Some of these perceptions included learning "more here." "More able to do a lot now.", " It's more advanced here in technology because in...[MG] we really didn't do much with it." and "Do a lot more now than in [MG]..." One student described her technological growth: "I never really even knew how to start a computer in...[MG] and now [in SG] I can just basically do everything that we were taught. Now I can make a video when before I'd be like "What?" Another stated, "My average in technology is 90 and higher here [SG] and my average in technology there [MG] was 30, 30 to 50" And still another commented, "I just learn more here [SG] and I want to do more and there's [sic] more options. It's more fun than ...[MG]."

One student described her experience: "I like the...[SG] much better because I learned much more at [school name] than I ever would have at a co-ed school." Another felt that learning technology in the single-gender setting helped her go further in computer: "If I had went [sic] to a mixed school, I probably wouldn't have taken computer courses. I probably wouldn't have went [sic] so far in computer studies." Some participants tried to explain why they felt they became more advanced in the single-gender technology setting. One such participant felt, "I found I learned more with technology here [SG] than any other [MG] school because the focus is not whether you're male or female but if you can do it." Another stated, "All girls is more comfortable."

Some participants found that they advanced in the single-gender technology setting due to being given a chance. One such student stated that the biggest difference between the two settings was, "Probably the chance females are given to show they are able to use technology." She went on to say, "I know a lot of females in this school [SG] who proved they are capable of using technology. Whereas in ...[MG] they probably weren't even given the chance to prove that." One student stated:

> My ability to use technology here [SG] as compared to my previous...[MG] has become a lot stronger because there is more chances to use the technology available to us...we receive many more chances to use the technology.

Another claimed, "Since I came to [the SG], I had more of a chance to use computers in ways that interest me."

Table 4.3.4 Synthesis of the sub-category _Distractions._
[SG]=single-gender technology setting
[Mg]=mixed-gender technology setting

Distractions
When you're here [SG] there's [sic] no distractions…In the [MG]…we have to stop and talk and figure out what we are going to do on the weekend.
In class with guys: they're sitting right next to you, always bothering you and talking to you. There's [sic] always these little love dramas you have to go through. Here [in SG] we're just all friends.
It's easier to pay attention to the teacher [in SG] than looking at a cute guy [in MG].
It's easier to concentrate with all girls. Males seem to be easily side tracked.
I find it's [SG] easier to understand… You understand full details. And in…[MG] people are loud and screaming and stuff. You can't really hear the teacher out. You don't get a better explanation of everything.
There's [sic] no distractions, and also you don't have to impress anyone [in SG].
It [MG] wasn't really focused. Here [SG] it's different. With all girls, we just don't focus on the guys.
It's not loud and people aren't screaming at you [in SG]. They're not loud and obnoxious now.
…there's nothing distracting me [in SG]. There's [sic] no outbursts in class that are taking away from the time from teachers.
At other schools [MG] they're worrying about getting a date for the weekend and stuff. Here [SG] you don't have to worry about that. If you're in a bad mood they'll cheer you up.

The category, *Distractions* groups those statements in which participants refer to distractions believed to be experienced in a mixed-gender setting that were not present in the single-gender technology setting. Distractions such as class disruptions, disruptions from teaching, male domination and the need to impress. Key statements included: *You can't really hear the teacher; it's easier to concentrate; there's nothing distracting me; and males seem to be easily sidetracked.*

Class disruptions that were described as a problem in the mixed-gender setting did not exist in the single-gender setting, according to several participants. One such participant felt she could learn technology better in the single-gender setting:

> I find it's [SG] easier to understand. You get a better outlook of it all. You understand full details. And in…[MG], people are loud and screaming and stuff you can't really hear the teacher out and you don't get a better explanation of everything.

Another student also felt that the single-gender setting was less disruptive: "It's not loud and people aren't screaming at you [in SG]. They're not loud and obnoxious now." Similarly, another explained why she felt she learned more in the single-gender setting in the following quotation:

> It's half because I know more so I'm more comfortable to do the projects which I know more because of the [SG], but also because there's nothing distracting me [in SG]. There's [sic] no outbursts in class that are taking away from the time from teachers.

Others indicated that, at times, just having boys in the class distracted females. One student commented, "It's easier to pay attention to the teacher [in SG] than looking at a cute guy." Another stated, "In class with guys: they're sitting right next to you, always bothering you and talking to you. There's [sic] always these little love dramas you have to go through. Here [in SG], we're just all friends. We can go to [school name] in our pajamas, and talk about what we want." Some participants perceived that there were fewer distractions when males were not present: "It's easier to concentrate with all girls. Males seem to be easily sidetracked."

4.4 Summary

The purpose of this chapter was to present a summary of the findings obtained through the processes of data collection and analysis. The findings presented in this chapter represented a synthesis of participants' perceptions of their experiences learning technology as they were communicated in the study through the questionnaire, interviews and focus groups. In this chapter, the contents of three categories and subsequent sub-categories were presented. For each of the three categories, sub-categories were derived

based on the identification of patterns in key statements. These three categories and sub-categories included:

- Single-Gender Technology Setting
  - Individual Attention
  - Confidence
  - Learning

- Mixed-Gender Technology Setting
  - Lack of Attention
  - Lack of Confidence
  - Lack of Learning
  - Distractions
  - Lack of Control

- Participants' Comparison Of The Two Technology Settings
  - Attention
  - Confidence
  - Learning
  - Distractions

The next chapter discusses and interprets the findings in relation to a larger context. It will focus on understanding the significance of the results and developing an understanding of these results in a context of females learning technology in single-gender and mixed-gender settings. The following chapter will also compare the findings with findings of studies presented in the literature review and will examine the implications for practice and research raised by this study.

Chapter 5
Discussion of the Findings

5.0 Introduction

The previous chapter identified a group of female students' experiences in learning technology in single and mixed-gender settings. It presented a synthesis of the findings comprised of statements extracted from questionnaires, interviews and focus groups. The statements were grouped and presented within categories according to a process of data analysis described in chapter three. The sub-categories presented the statements grouped as a result of identifying patterns in key statements.

This chapter presents an interpretation and analysis of the findings in relation to their significance and implications for practice and research. The findings that are most relevant are those that relate directly to the study's purpose, which was to gain insight into a group of female students' experiences learning technology in single-gender and mixed-gender school settings and how they compare their experiences in the two settings. The discussion also considers these findings in relation to the findings presented in the review of the literature in Chapter 2.

The discussion is organized according to two categories so as to simplify and clarify findings according to the purpose of the study. Data related to participants' comparison of their experiences were not presented in a separate category in this chapter. Instead, the data were grouped into either of the following categories, depending on how it was worded:

- Experiences of Learning Technology in a Single-Gender Setting

- Experiences of Learning Technology in a Mixed-Gender Setting

As well, the significance of the findings in the context of learning technology in single-gender and mixed-gender settings and suggestions for further research and implications for practice will be discussed.

5.1 The Context of the Findings

The discussion presented in this chapter is guided by recognition of the limitations and purpose of this study as well as the context in which findings were gathered. In this regard, it is important to note that the design of the study allowed for consideration of students' past experiences in a mixed-gender junior high school technology setting versus their current experiences in a single-gender senior high school technology setting. The study provided an opportunity for participants to compare these two sets of experiences. However, the two sets of experiences that are compared relate to a change in at least three different characteristics of the settings. One set of experiences relate to a setting with these characteristics:

1. Single-gender setting
2. High school
3. Current experience

The second set of experiences relates to a setting with these characteristics:

1. Mixed-gender setting
2. Junior high school
3. Past experience

The findings revealed that the single-gender experiences were more positive overall and for the majority of participants in relation to learning, confidence, attention, control, distractions and empowerment. However, participants' perceptions of their experiences in these two different settings are affected, we can assume, by all three

characteristics and not only by gender composition. For example, the fact that the teachers appeared more attentive or that participants experienced greater confidence or were less distracted in the single-gender setting may result from the fact that one setting was a junior high school and the other (more positive one) a senior high school. As well, these findings could be related to the difference in factors such as age, and maturity level, class size and the availability of technology in the two school settings. The two different sets of experiences may result as well from the fact that one set of experiences takes place in one school whereas the other takes place in another school. To focus more specifically on the single-gender versus mixed-gender characteristic would have required a research design that compared for example a single-gender high school with a mixed-gender high school or a single-gender junior high with a mixed-gender junior high school. However, this design would have resulted in a study of the experiences of two different sets of individuals. This study was interested in gaining insights into one group's experiences of the two different settings. These parameters of the design of the study therefore should be kept in mind as the findings are discussed.

The reader must also keep in mind that participants' descriptions of their experiences may be reflective of a general whole school experience and not only of a technology class. All questioning in the study aimed to focus on participants' comments in relation to technology class specifically. However, we can assume that some of the statements made could relate to their experiences in general. This generalization of their experiences beyond technology class is evident in such statements as the following: "It's a smaller school too, and female dominated. You can have a personal connection with the teacher." In addition, we must also keep in mind that no research observations took place

and that the study reports on participants' interpretations of their experiences. Had observations been conducted or had males or teachers been interviewed as well, the findings related to females' experiences might have differed.

There were a small number of comments that differed from those of the majority. These experiences were not discussed in length in this discussion because they represented a small minority. Observations might have shed light on why these different experiences occurred.

5.2 Experiences of Learning Technology in a Single-Gender Setting

The portrait that emerges from participants' descriptions of their experiences of learning technology in the single-gender setting is one which is very positive and flattering and one which is conducive to learning technology. Participants described their experiences of learning technology in the single-gender technology setting as one in which they were able to learn more and in which they enjoyed using the technology.

Students described experiences related to new forms of learning and using the technology as well as enjoyment of learning the technology. Participants described how in the single-gender technology setting, their technology skills grew and they learned more about technology and became more capable of using the technology. Some confided that they surprised themselves with what they learned to do with technology and others described having fun using and learning about the technology and remarked that this made them eager to learn more as well. Some perceived that the technology learned in the single-gender setting was more advanced, their tasks more complex, and thus they learned more.

As they were given more opportunities to use technology in the single-gender class, participants also described being able to grow and learn more in the area of technology in the single-gender setting. Participants spoke of the increase of opportunities to use the technology in this setting as they had more chances to use different types of technology, more chances to do things that interested them and more opportunities to try new things. Some commented that they were given more opportunities because they were trusted to use the technology in the single-gender setting. Others found that they were encouraged to use the technology in the single-gender setting and that they were given the opportunity to explore the technology independently. Some remarked that these opportunities led them to take more risks and to be more creative and perceived that this in turn gave them more technology skills and more knowledge. As well, some remarked that this empowerment led to more opportunities for use of technology for the future as more doors were now opened for them. Others expressed satisfaction with what they perceived as an increase of opportunities to discover what it was that interested them and being given the skills to further these interests in the future.

In previous studies involving participants' experiences in single-gender settings, issues associated with learning were common. A study by Nicholson et al. (1998) on grade one students working in single- and mixed-gender groupings in a mixed-gender class found that single-gender groupings fostered a positive attitude towards technology. Participants in the Nicholson et al. study indicated that they had more positive experiences working with computers in the all-female groups than in the mixed-gender groups. Similarly, Elkjaer's (1992) study concluded that females learned more about

technology when they moved into all-girl groups than they did when they were part of the whole class.

Lichtman (1998) found that an all female computer club contributed to participants having a more positive attitude towards technology as well as increasing females' interest in technology and technology-related fields. These findings are congruent with the findings of this study, which also found that females in the single-gender setting had a more positive attitude towards technology. Females in this study indicated that they were able to do more interesting things with the technology and that they learned more with the technology and thus found technology more enjoyable than they had in the mixed-gender setting. When reviewing literature on single-gender education in general, Streitmatter's (1997) study on the attitudes of females in a girls-only algebra classes uncovered that this type of learning environment enhanced the females' ability to learn math. As well, Streitmatter's (1998) study of single- and mixed-gender physics classes determined that girls in the single-gender setting became more involved in collaborative learning than did the girls in the mixed-gender physics class. These findings are congruent with the perceptions of females in this study when they stated that they learned more and wanted to learn more in the single-gender setting.

Similar to past studies, this study has determined that the learning of technology was perceived by students to have occurred more in the single-gender setting. This study also sheds some light on why participants felt this was the case as they described learning more due to the technology being more advanced, and the tasks more complex. Others described learning more because of having more chances to use different types of technology, more chances to do things that interested them and more opportunities to try

new things. Others described learning more due to being encouraged to use the technology and to try new things. Thus, perceptions of learning more about technology in the single-gender setting and technology being more purposeful was attributed to participants feeling that the technology learned was more advanced and complex, that they were given more opportunities, and that they were encouraged more to use the technology.

From participants' descriptions of their experiences we can gain insight into the conditions that are favorable to learning technology. These conditions include individual attention, and confidence. These conditions may have given rise to their perceptions of learning more in the single-gender setting.

In terms of attention, participants expressed a degree of satisfaction with the amount of individual attention they received in this technology setting. They described getting help when it was needed and having their questions answered. In terms of teacher time, some described feeling that the teachers had time to answer their questions, time to help them, and time to pay attention to them. Also, these participants perceived that the single-gender technology setting was fair: they knew that the teachers were going to answer their questions and they were going to get their turn. As well, some perceived that they were encouraged more to use the technology and that they were more connected to the teachers and to other students than in the mixed-gender setting. Some participants commented that the single-gender setting offered them more opportunities, and more support and encouragement to use the technology.

The findings of this study on attention are related to those of Streitmatter's (1998) study that reported that girls indicated receiving more of the teachers' attention in the

single-gender setting because no boys were present. As well, Elkjaer's (1992) study of

mixed-gender learning found that when females broke off into smaller, all-girl groups,

they received more help from the teacher and helped each other more as well. Elkjaer's

findings are congruent with the perceptions of participants in the present study where

participants commented that they received more help, not only from the teacher but also

from their peers in the single-gender setting. Participants' indicated that when the teacher

was unavailable, friends and peers were there to help.

In terms of confidence in the single-gender setting, participants noted feeling

more confident and thus more willing to participate in class. These findings are similar to

those of Streitmatter's (1998) study, which found that females participated more and

became more involved in the class learning, in this case collaborative learning, in the

single-gender setting.

The findings of this study may provide further insight into why females are more

willing to participate in a single-gender setting. Some participants described how the

absence of males from the technology setting affected their confidence and participation

because they felt secure and free from criticism and the need to please males. Some

indicated that in the single-gender technology setting, they could show who they really

were and be their true selves. Others perceived themselves as more outgoing and more

confident using technology in the single-gender setting. Still others remarked that they

could take more risks with technology, explore new programs, choose topics that interest

them and try more difficult things in a setting with no males present. Participants

expressed feeling more confident in the single-gender setting, as they were not afraid to

make mistakes with the technology because they did not fear being made fun of, or

criticized like they perceived they were in the mixed-gender technology setting. This increased sense of security in the single-gender setting was attributed to some participants feeling more confident and more willing to participate in class and to take risks.

In relation to confidence in single-gender settings, Furger's (1998) study found that girls preferred nurturing all-girl environments where they were not intimidated by more computer-literate males. The AAUW (1998) study on single-gender education involved an extensive review of the research conducted on single-gender education. Although that study concluded that there was no evidence that single-gender education was better than mixed-gender, it did find that, in most cases, females' confidence and risk-taking increased in single-gender settings. This finding is congruent with the perceptions of participants in this study of increased confidence in the single-gender technology setting as compared to the mixed-gender setting.

In addition to findings related to confidence specifically in technology settings, the findings of this study are also congruent with those of research on female confidence in single-gender environments in general. Previous research conducted by Gillibrand et al. (1999), Streitmatter (1997), and Warrington and Younger (2001) identified differences in confidence and participation levels of females in mixed- and single-gender environments. One of the main findings of Gillibrand et al. (1999) was that females in the single-gender learning setting had increased confidence and participation levels. As well, females in this study were found to be more willing to participate in discussions, seek help when it was needed and share ideas in the single-gender setting.

Similarly, Streitmatter's (1997) study found that girls in single-gender high school Algebra classes as compared to mixed-gender Algebra classes, were more likely to ask

questions and more likely to answer questions on the subject matter. A similar study by Warrington and Younger (2001) found females frequently expressed having more confidence in their selves in the single-gender setting. As well this research found that girls found it easier to contribute to oral discussions and to ask questions without being ridiculed in the single-gender setting. Finally, girls expressed caring more about their work, and feeling less inhibited in their single-gender classroom.

5.3 Experiences of Learning Technology in a Mixed-Gender Setting

The portrait that emerges from participants' descriptions of their experiences of learning technology in the mixed-gender setting is one which is negative and unflattering and which was not conducive to learning technology. Participants described their experiences of learning technology in the mixed-gender setting as one in which they were unable to learn and in which they did not enjoy using the technology.

Participants generally described learning little about technology in the mixed-gender setting. They also described how in this setting, the technology lacked purpose. Some spoke of not learning a lot about technology and indicated that they felt this was due to the technology not being used to its potential. Others described using the technology very little and not doing anything significant with the technology. They described doing meaningless tasks, learning things they already knew or just wasting time in the computer class. Some participants complained of not being able to work with technology independently, of having little opportunity to use the technology or to learn new things with the technology, and felt that this lack of opportunity resulted in their not learning with the technology. Some spoke of their mixed-gender technology setting as lacking structure while others spoke of it as being over-structured. Overall, there was a

sense that technology class in the mixed-gender setting held little purpose and very little learning took place there.

When reviewing previous studies involving participants' experiences in mixed-gender technology settings, issues associated with learning were common here as well. Elkjaer (1992) determined that females in the mixed-gender computer classes in her study learned little about technology when participating in the mixed-gender class but that their learning took place, instead, in smaller all-girl groupings after the lesson. These findings are similar to the perceptions of females in this study who commented that they had learned less and had lower marks in the mixed-gender technology setting than they did in the single-gender setting where they felt their learning and their grades increased significantly.

In contrast to these findings of females perceiving they learned more in the single-gender setting as opposed to the mixed-gender one, a study by Manger and Gjestad (1997) that investigated the relationship between the ratios of boys to girls and math achievement, reported that the class with more girls did not result in higher achievement for girls than the class with fewer girls. The authors concluded that a classroom with more girls than boys did not result in higher achievement for girls and thus, according to the authors, these findings supported teaching in mixed-gender classes. Similarly, a study by Kutnick (1997) which examined learning technology in single and mixed-gender groupings concluded that girls using technology in the mixed-gender groups scored higher than the girls in the single-gender groups did. Although the present study did not measure achievement between the single- and mixed-gender settings, several participants expressed learning significantly more about technology and having better marks in the

single-gender technology setting than they had had in the mixed-gender technology setting.

In terms of successful mixed-gender technology learning, Mayer-Smith et al. (2000) investigated if competence in technology-enriched science classes was gender specific. They determined that a mixed-gender classroom could be successful in offering gender-inclusive technology experiences if the social organization and the pedagogical practices of the classroom promoted these gender-exclusive experiences. Participants' perceptions of learning technology and their competence in the mixed-gender setting indicated that, their experiences, the social organization and the pedagogical practices of the mixed-gender settings did not promote gender-inclusive technology experiences or competence.

From participants' descriptions of their experiences we can gain insight into the conditions that are unfavorable to learning technology. These conditions include lack of attention, lack of confidence, distractions and lack of control. These conditions may have given rise to their perceptions of learning less in the mixed-gender setting.

In relation to attention, or lack of in the mixed-gender setting, participants in this study indicated that they received little to no teacher attention when using technology in the mixed-gender setting. Participants' perceptions were, for the most part, of a mixed-gender technology class where males were favored over females and where teachers focused more on helping the males. Some participants indicated that they felt the teacher/student relationship differed between males and females and that this relationship was unfair. They described how, in the mixed-gender setting, the teachers appeared to have a closer relationship with the males and they perceived this to mean that they

favored them. As a result, some described feeling excluded and left out of the close relationship between the males and the teacher. As well, some participants perceived that teacher help was also unfair with males getting more frequent help and receiving this help before females. Some participants indicated feeling insignificant as they perceived that males got help without asking while females were asking and could not get help.

In reviewing the literature on the issue of attention in mixed-gender settings, findings were similar. Elkjaer (1992), who studied single-gender technology use in two mixed-gender computer classes, also discovered that males received more of the teacher's time and attention. Another study with findings congruent with those of this study was conducted by Huang, et al. (1998), who found that the teachers studied perceived that females were not interested in technology as were males and thus did not encourage the females to use the technology as they did the males. Similarly, the AAUW (2000) report on girls and technology, found that teachers in the American school systems studied did not encourage females to use the technology available to them.

In this present study, participants also perceived that the teachers encouraged the males more. However, this study also found that participants felt that teachers also gave males many more opportunities to use the technology than they did females. For example, some participants expressed frustration with what they perceived as unfair selection of students for extra technology use. They concluded that males' work was chosen more as examples, males were called upon more, and males were given more complicated tasks, such as running the technology for assemblies or class presentations. This perception resulted in further feelings of exclusion for participants as well as lower expectations for themselves, as they perceived this inequality in student selection was the

result of teachers' expecting less of females and assuming that the females could not do the tasks that the males could.

The literature on females' experiences in education as a whole and not just technology education, revealed the amount and type of attention received were issues in mixed-gender classes in general. In Sadker and Sadker's (1994) study of males and females in public education in the U.S, the authors found that males received more teacher attention and interaction, and got more and better quality feedback, whereas female students described feeling as if they were "invisible." In her study of females learning science in a mixed-gender science class, Kelly (1988) found that males received better quality and quantity of teacher interaction and that they consistently dominated the teacher's time. This imbalance in teacher attention and interaction was also identified in Orienstein's (1994) study of female interaction and treatment in two mixed-gender schools where it was found that teachers interacted much differently with males than with females and males were allowed to dominate teacher time and attention.

These findings are congruent with those of this study where participants indicated a strong sense of frustration at what they perceived as being ignored in the technology setting. Some remarked that females were treated as if they were not present or as if they were "invisible". Some participants described this lack of attention as resulting from unfair teacher interaction and teacher attention in the mixed-gender technology setting. Some described not getting the help that they needed, not getting their questions answered and not having the attention of the teacher. Similarly, Streitmatter (1998), whose study focused on single-gender and mixed-gender high school physics classes, found that teachers interacted more and gave more attention to males.

In terms of participants expressing a lack of confidence in the mixed-gender setting, a study by Nicholson et al. (1998) who researched grade one students working in mixed-and single-gender groupings in a mixed-gender classroom, found similar effects on confidence. According to these authors, dominant male behavior resulted in females yielding to the language and behavior of males. As well, the study determined that this dominant male behavior resulted in some females losing confidence in their computer abilities.

These findings are congruent with the perceptions of participants in the present study where females raised concerns of feeling inferior in their abilities in technology as compared to males. Some participants described not wanting to be in technology class because they felt that boys had higher quality work than they did. They interpreted this higher quality to mean that the males knew more about technology than they did, and that the teachers thought this as well. In the current study, some perceived that teachers thought males had higher quality work as well. Some commented that teachers expected more from boys and thought they knew more about the technology than did the girls. As well, participants also remarked that they felt teachers believed that the girls were less skilled and therefore further behind the males in the class. Also, a study by Fey (1997), who investigated on-line collaboration between college and high school students, found that the dominant and hierarchical language of the males caused some females to back off, withdraw participation, and be silenced. Similarly, in this study some participants described withdrawing their participation and feeling inhibited by males.

The present study may offer insight as to why these females participated less in the presence of males. Some described being intimidated by what males thought of them

and by what males might say about females if they participated in class. Others perceived that males were judging them and that this inhibited their participation and learning. Others spoke of not taking risks, not asking questions or participating in class and not asking for help because of their fear of being wrong or of looking too smart in front of the males. Still others described doing what the males were doing with the technology instead of doing what they wanted to do just so as to impress the males.

Similar to these findings on females' desire to please in the mixed-gender setting, Singh's (1993) study on teacher and student perceptions of their computer competence in mixed-gender grade five setting, found that females expressed a desire to please their teacher and the males in the class. This situation created an internal struggle between females wanting to please the others and wanting to prove they were capable of using the technology. As well, a study conducted by Dixon (1998) saw evidence of females sacrificing their rights for males. This study focused on females' behavior in mixed-gender design and technology classes and found that females acted as if the males' needs were more important than their own and put the males' needs before their own as they allowed the males to use the technology before them. These findings relate to the present study as females described sacrificing their interests and desires with learning technology to instead do what they boys were doing or wanted to do.

A study conducted by the AAUW (1998), found that females exhibited less computer confidence than males and a less positive attitude towards computers. Similarly, research conducted by the NCES (2000) determined that girls were less likely than males to say they liked technology or that they were good at using it. As well, an earlier study conducted by the AAUW (1991) on public education found that females had

much lower self-esteem than males and were much more likely to say they were not good enough. These findings are congruent with the perceptions of some participants in this study when they described that males were better at using the technology than they were and that they had a lack of confidence in their abilities with technology in the mixed-gender setting.

In terms of lack of control, participants in the present study described the technology setting being dominated and controlled by males. Some participants described the males controlling the technology, the classroom and the female students through taking over the technology, and through ridicule and criticism. They described males controlling the computers and dominating the world of technology as a whole. As well, participants indicated feeling that males dominated the female students through ridicule and criticism. Some participants described technology classes where males made negative comments and criticized them about their work.

Similarly, several past studies identified male domination and control occurring in mixed-gender school settings similar to the domination described in the mixed-gender technology settings of this study. Oreinstein's (1994) study of females' experiences in mixed-gender schools found males were able to dominate teacher time, and attention, and oppress females in the classroom. Nicholson et al (1998) identified characteristics of males using technology that included giving orders and instructions as well as creating competition. As well, Nicholson et al concluded that the dominant behavior of males resulted in females in their study yielding to the males. These findings are similar to perceptions of females in this study when they described how males dominated the technology and the teacher in the mixed-gender setting.

Elkjaer (1992), also found that males dominated the mixed-gender classroom and that the needs of the females in that study were placed second to the needs and wants of the males. Similarly, Fey's (1997) study on on-line collaborations found that the dominant language of the males caused females to withdraw their behavior. Also, Singh (1993) discussed male domination in a mixed-gender grade five technology setting. Singh determined that with the support of the teacher, males dominated the computers and the classroom resulting in females feeling frustrated at this dominance and the teacher's acceptance of it. Similarly, participants in this study expressed frustration with not getting an equal opportunity to use the technology or to learn with the technology and perceived males' dominance of the technology to be the cause.

Distractions were also identified as a condition disrupting learning in the mixed-gender setting in this study as participants expressed difficulties listening, concentrating and learning the technology due to the distraction of males. Some participants indicated feeling very resentful of the presence and distractions of males when using technology. Others felt that males distracted them from their work, from paying attention to their lessons, and from learning the technology. Some perceived that the physical presence of males in their technology class was a distraction in itself as they indicated that their attractions to males caused them to pay attention to the males instead of their work.

More commonly expressed was the perception of participants that males repeatedly distracted them from learning technology. Some spoke of males being noisy and loud, thus causing them to be unable to hear the teacher or understand the lesson. As well, others remarked that their learning of the technology was disrupted due to males interrupting the lessons and forcing teachers to stop teaching to reprimand the males.

Participants perceived that they lost valuable teaching time due to the behavior of males in their mixed-gender technology setting and some commented that these distractions affected their marks. Hence, these recurring distractions and interruptions to lessons by males were perceived by some participants as affecting their concentration and comprehension of learning technology in the mixed-gender setting.

Similarly, studies such as Orienstein (1994), Warrington and Younger (2001), and Streitmatter (1998), all found issues of distractions for females in mixed-gender settings. However, none of the settings in these past studies were specifically technology settings, and no such studies were uncovered in the literature review that concentrated specifically on distractions in mixed-gender technology settings. This being the case, there were still many congruencies with this past research in terms of females' perceptions in the mixed-gender school setting overall in terms of distractions experienced. Orienstein (1994) found that in the mixed-gender school, males disrupted the classroom more than females by interrupting lessons, speaking out of context and ridiculing females. In Streitmatter's (1998) study of females in mixed- and single-gender physics classes, participants unanimously agreed that they were able to get more work done in the single-gender setting and attributed this to the absence of boys. Warrington and Younger's (2001) study of mixed- and single-gender classes found that female participants could concentrate more in the single-gender setting and these females attributed this to the absence of the distractions caused by noisy boys. These findings are congruent with this study in which participants described boys as being loud and their noisy distractions in class affecting their concentration as well as their understanding of the teacher and of the technology lesson.

The findings of this study can also be interpreted in light of the literature on the socialization of young woman. Sandra Acker (1994) states that through feminist work on the social processes within schools, an understanding of ways in which schooling contributes to the reproduction of gender relations emerges. According to Acker (1989), feminist theories on socialization include views that schools play a role in reproducing a sexual as well as a social division of labor, that girls are socialized by the schools (and society) into traditional stereotypical roles, and that male dominance and a male-oriented curriculum deny females full access to knowledge.

Findings of this study coincide in some cases with these feminist theories of education. In this study, participants, at times, indicated that the boys got to use the equipment, and received more opportunities to try new things than the girls did. As well, participants indicated feeling that the teacher expected more from the boys and less from the girls in terms of success in the learning of technology. Participants spoke of males dominating teacher time and attention, as well as the technology. Others described feeling that the choices and the finished products of the males were better than those of the females and that the teacher thought so as well. This supports some of the feminist views on the socialization of education, which state that females' work is devalued in school and that the value of education is based on the males. Also, participants described feeling a great deal of pressure to fulfill the role of the "pretty" female in the mixed-gender technology setting, and the mixed-gender setting overall. Participants spoke of always having to wear make-up and "dress up" and many indicated that the single-gender environment was a reprieve in this sense, as here they did not have to worry about their looks.

Gaskell (1989) also discusses the socialization of females in education and states that females want to be doctors and lawyers and they want equal opportunities but then in the real world they choose traditional roles and accept their place in society. This can be connected to the participants in this study in the sense that they perceived that the males dominated the teacher time and attention, that teachers in some cases paid more attention to, and expected better results from, the males, yet for the most part the females remained silent. It may be deduced that perhaps these females participated in their own oppression by remaining silent, and by allowing the males and the teachers to dominate the classroom. Also, while some participants stated that the boys were smarter and better at technology than they were, others did not think the boys were smarter yet they did not insist on equality either.

However, the participants in this study were found in some cases to resist this socialization within the technology setting. The participants stated that while the teachers were often helping or reprimanding males, they taught themselves the technology; they answered their own questions and worked through their problems. Others spoke of helping each other; of getting help from girls around them instead of asking for teacher assistance. These participants indicated that they had developed a female network of help, assisting each other as well as supporting each other within the technology setting. This, in turn, helped them to develop competence and confidence in their ability to learn technology despite the obstacles.

5.4 Implications for Practice

Firstly, in terms of learning and empowering students, educators may need to be aware and knowledgeable of what students perceive as favorable conditions in which to

learn. Students' perceptions that the conditions for learning in their classroom are favorable and conducive to learning may affect their learning. Teachers and educators may benefit from recognizing students' perceptions of the various conditions that they feel might promote learning including feeling supported, feeling helped, confident, secure, capable, and empowered. As well, based on females' positive perceptions of learning technology in the single-gender setting, teachers may wish to provide more grouping of students based on gender so as to promote the positive aspects of single-gender learning in a mixed gender setting.

Administration might examine their mixed-gender technology classes to determine if they effectively meet the needs of the students both male and female. As well, administration could offer professional development which may provide opportunities for teachers to become more aware of issues related to gender and learning. Such professional development opportunities might ultimately improve the conditions of learning for females in mixed-gender technology settings.

In reference to attention, educators of technology in mixed-gender settings need to pay attention to the perceptions of females of the imbalance in teacher time and attention and try to change this perception by offering equal opportunities for help and attention in for both males and females. Educators may also aim to be more attuned to the perceived difference in the quality of help given to males and females in the mixed-gender setting and by providing equitable teaching practices, assure females that the quality of help is the same for both genders. Teachers will need to recognize females' perceptions of the differences in opportunities for males and females so as to ensure that both genders are offered equal opportunities to try new things with technology and to show their

accomplishments. Teachers of mixed-gender technology classes may also need to be aware of females' perceptions of teachers' expectations so as to change the conditions that led to these perceptions by providing equitable teaching strategies

In terms of confidence, teachers of technology classes may benefit from being more aware of the lack of confidence some females have in themselves, their self-consciousness in front of males in the mixed-gender technology setting, and the effect of this self-consciousness on their participation and their overall presence in class. Teachers may find it useful to actively promote females' confidence through specific techniques and measures. It may be of use to schools to provide these teachers with professional development opportunities to learn these techniques and measures that help to promote female confidence.

In terms of control and dominance, females' perceptions of male dominance in the mixed-gender technology setting should be known and efforts to eliminate these perceptions by promoting equal opportunities to use the technology should be put forth. As well, teachers may need to be aware of perceptions of males dominating teacher time and attention so as to find ways to assure all students that teacher time and attention is distributed equally to all. As well, the impact of negative comments, ridicule and criticism on female students' confidence and participation should be understood by educators and attempts should be made to encourage a positive classroom environment.

Teachers also may need to be aware of the types of male distractions perceived by females in the mixed-gender setting so as to better create a positive, learning friendly classroom environment which decreases the noise level and class disruptions so as to ensure a better quality technology education to all in the mixed-gender setting.

5.5 Implications for Further Research

Given the above findings on learning technology in a single-gender setting, as well as prior research findings on single-gender learning and single-gender groupings, educators may systematically inquire into improving the conditions for females learning technology in mixed-gender settings. This could include ways in which to make technology more "girl-friendly" so as to interest girls more in the mixed-gender setting.

Another implication for further research is to group students in mixed-gender technology settings and compare single- and mixed-gender groups within the mixed-gender technology classroom. Also, based on the above findings, a study could be conducted on researching peer help in both single- and mixed-gender settings and how this peer-help affects females' perceptions of learning. As well, it may be worthwhile to conduct a study involving observations and interviews with educators in mixed-gender schools in order to compare their interactions with males and females.

It may be of value to conduct research into female students' perceptions of their learning technology in two *high* school settings and to compare these findings with those of this study as this study identified major differences in skills and knowledge gained in the single-gender high school setting compared to the mixed-gender junior high setting. Such research may determine how much of the results of the present study were influenced by the actual school setting, how much was influenced by changes in technological advancements over time, and how much was influenced by the maturity of the participants.

As well, it may be beneficial to study males' perceptions of their experiences learning technology in a mixed-gender junior high and single-gender high school. A

study could also be conducted that individually researches each of the conditions found by females to be conducive to learning: attention, confidence, distractions, and control and compares findings with those of this study. It may be worthwhile to conduct a longitudinal study on a group of female students' experiences learning technology from high school to university and beyond so as to gain insights into the long-term impact of single-gender technology education on female achievement. Also, a similar study which researches female students' expectations and aspirations for the future and see if these change from the mixed-gender to single-gender technology setting may be beneficial.

Additional areas for future inquiry include: research that examines specifically the issues of teacher-support available for females in mixed-gender settings, research that examines the experiences of females specifically in mixed-gender technology classes or mixed-gender classes overall, research that examines the role of the teacher in mixed- and single-gender technology classes from both a student and a teacher perspectiveresearch that determines the skills and training required to establish a gender-equitable technology learning environment.

5.6 Conclusion

Through their participation in this study, the participants provided insight into their experiences learning technology in two different school settings: single-gender and mixed-gender. They also provided insight into what they perceived as conditions that promoted learning technology and conditions that hindered learning technology. Finally, participants shed some light on the differences in learning technology in single- and mixed-gender settings, as well as issues related to attention, confidence, distractions, control and learning that arose and affected learning technology in the two school

settings. This study adds to the growing body of literature on single-gender education, and more importantly it allows us to identify the perceptions of females' learning in these two settings, which, in turn, offers us insight into both the challenges and the benefits of single- and mixed-gender approaches to schooling.

In keeping with the stated purpose of this study, which was to gain insight into a group of female students experiences learning technology in single-gender and mixed-gender school settings and how they compare their experiences in these two settings, the implications for practice and research focused on participants' perceptions of learning technology in the two settings. The study found that learning technology in a single-gender setting differed greatly from learning technology in a mixed-gender setting.

This study indicates that participants' preferred learning technology in the single-gender setting where they perceived learning in a positive light and where they felt conditions were conducive to learning. Participants described receiving more attention and support as well as feeling more confident, that they had fewer distractions, and more control over their learning and over the technology. They indicated that these conditions generated more learning in the single-gender setting. In comparison, participants indicated that they did not learn much about the technology in the mixed-gender setting, where they had negative perceptions of learning technology. Participants indicated feeling that conditions were not conducive to learning technology as they felt unsupported and ignored. As well, they expressed feeling that they had little confidence and security in the mixed-gender setting, where they felt distracted and dominated by males and therefore felt that they learned little about technology in the mixed-gender setting.

One of the more important implications arising from this study is the need for students, educators, administrators and policymakers to be cognizant and aware of classroom conditions students view as positive and conducive to learning, as well as classroom conditions students view as negative and non-conducive to learning. Educators need to be aware of their role, the perceptions of students and the knowledge and skills required to deliver technology in a gender-equitable fashion. Finally, administrators and policymakers need to examine their mixed-gender technology environments to determine if they effectively meet the needs of all students, both male and female. Administration may also need to offer educators more professional development opportunities to help them become more aware of issues related to gender and learning so as to help to improve the conditions of learning for females as well as to provide positive learning environments for all students.

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Appendix A

Verbal Introduction to Students

Hello, my name is Lee-Ann Burke and I wish to interview you here at school, to investigate your perspectives and opinions on learning and using technology at an all-girls school as compared to your previous mixed-gender junior high school.

All information gathered in this study is strictly confidential and at no time will you be identified. Your participation is voluntary and you may withdraw at any time. You may also decline to answer any individual questions or stop the interview or activity at any time. As well, all of your responses will remain anonymous. Each meeting with me will take approximately one hour of your time.

If interested, your participation will consist of completing a questionnaire on your experiences. After this, you will be asked to participate in an individual interview and a focus group or group interview, focusing on your experiences with using technology in both schools and your experiences at an all-girl school overall.

The proposal for this research has been approved by the Interdisciplinary Committee for Ethics in Human Research and by this school board. The results of my research will be made available to you upon request. All audio recordings made during the interviews will be held in a secure location and destroyed upon completion of the study.

If you are interested in participating in this study, raise your hand and I will give you an information sheet and a consent form to be filled out by you and your parents and returned to me. If you have any questions or concerns, please ask.

Thank you for your time,

Lee-Ann Burke

Appendix B

Questionnaire

SURVEY

Experiences of Females Using Technology in an All Female Environment.

Please remember that participation in this survey is completely voluntary and all answers will be kept confidential and used only for research purposes.

1. How do you feel about your ability to use technology here as compared to your previous mixed-gender (boys and girls) school?

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2. What was your experience using technology at your previous mixed-gender junior high?

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3. What has been your experience using technology at this all-girl school?

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4. How would you compare single-gender technology use to your previous mixed-gender technology use? Explain.

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5. Concentrating on your technology use, how would you compare the amount of risks you take (i.e. trying something new) when using technology here in a single-gender school as compared to your mixed-gender school?

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6. What were the similarities and differences (if any) between single-gender and mixed-gender technology use and learning? Explain.

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7. What did you like about one setting or the other? Why?

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8. Which setting do you prefer? Why?

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9. Would you recommend/not recommend a single-gender technology education? Why?

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Thank you very much for your time!

Appendix C
Guiding Questions For Interviews

Guiding Interview Questions

1. Thinking about choosing high schools to attend, what reasons do you feel girls come to [present school]?

2. What reasons did you come to [present school]?

3. Thinking of your technology class here at [present school], I would like to get a general idea of a typical computer class, what do you do? What is it like?

4. I'd like to have you go back in time to when you were in your mixed-gender technology class in junior high, with both girls and boys; what was a typical computer class like then?

5. What was it like to be a female using technology in your junior high classroom?

6. What role did females play in this technology class?

7. What role did males play in this technology class?

8. What role did the teacher play in this technology class?

9. Thinking of your high school technology class here at [present school], you do Web Pages and slideshows, how is that the same as what you did at your previous mixed-gender junior high technology class? How is it different?

10. On your questionnaire, when asked.......

Appendix D
Guiding Questions for Focus Groups

Guiding Focus Group Questions

1. What was a typical computer class like in your mixed-gender junior high school?

2. What was it like to be female in this junior high technology class? Was it the same or different as being male?

3. Thinking of your mixed-gender junior high technology class, would you say that everyone was at the same level or were there differences?

4. Thinking of you mixed-gender technology class, would you say students interacted equally with the teacher? Explain.

5. Thinking back to your mixed-gender junior high technology class, were you able to get the help you needed?

6. How about now in your single-gender technology class?

7. Thinking of your comfort level when using technology in the single-gender setting, how would you describe your level of comfort?

8. How has being in a single-gender technology class affected your ability to use technology?

9. Has a single-gender technology setting affected your confidence? Explain.

10. Thinking of your attitude towards technology in your present single-gender setting, how would you describe it?

11. Has the single-gender technology setting affected your comfort level with technology? Explain.

12. What are the similarities between single-gender and mixed-gender technology settings? What are the differences?

13. How would you compare using technology in a single-gender setting to using technology in a mixed-gender setting?

14. Would you say that your attitude towards technology now in the single-gender setting is the same or different from the attitude you had in your mixed-gender technology setting?

15. Would you say your comfort level towards technology now is the same or different from in your mixed-gender technology class?

16. Thinking of your ability to use technology in your past mixed-gender setting, as compared to your ability to use technology now in your single-gender setting, would you say you are more able to use technology now, less able or the same?

17. Thinking of your confidence using technology in a single-gender setting as compared to your confidence using technology in a mixed-gender setting, would you say you are more confident, less confident or the same in a single-gender setting?

18. Thinking of your class participation now in the single-gender technology setting, would you say your participation is more, less or the same as in the mixed-gender setting?

19. Thinking of your present single-gender technology class, would you say that your expectations are the same or different from your mixed-gender technology settings?

20. Which technology setting do you prefer: Single-gender or Mixed-gender? Why?