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How Adolescent Boys and Girls View Today's Computer Culture

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Abstract

This paper summarizes a yearlong qualitative study of uses and mental concepts of computers and computer culture in seventh and eighth grade boys and girls. A social-constructivist stance formed the theoretical framework for this study. I used interpretive methods in technology-rich, middle school classrooms to study gender-specific meanings for the technology tools used by students. My goal was to gain insight into how adolescent boys and girls conceptualized and used computers in the current computer culture. By focusing particularly though not exclusively on girls, I hoped to shed light on how girls view their experiences with technology. The focus of this study was not to further investigate the perceived gender gap regarding technology, but rather to address the meanings that adolescents assign to computers as they interact with them. Adolescent boys and girls view and use computers differently. Each gender seems to accept this as a natural part of its culture, and, in general, is accepting of each other's visions and uses.

Introduction

A social-constructivist stance forms the theoretical framework for this study. I view both gender and computers as social constructions that exist in particular contexts. Gender is assumed to be constructed within a culture and not genetically inherent in an individual. West and Fenstermaker (1993) believe that gender is "a mechanism whereby situated social action contributes to the reproduction of social structure in which people do gender; and men and women do it differently" (p. 158). In a similar vein, objects, such as computers, take on meanings constructed by individuals as they interact with these

objects. Technologies do not exist in a vacuum – with no history and no social implications or connections. Technologies exist only in social contexts. People negotiate and renegotiate meaning as they personally interact with objects, thereby constructing a social order as well as a personal meaning. Within this perspective, gender and computers are social constructions that vary from person to person. This research delves into these personal meanings.

The focus of this yearlong qualitative study of seventh and eighth grade boys and girls was not to investigate further the perceived gender gap regarding technology, but rather to address the meanings that adolescents assign to computers and the ways they interact with computers. By focusing particularly though not exclusively on girls, who historically are either left out or are underrepresented in studies of technology, I hoped to shed light on how girls and boys view their experiences with technology. In my role as teacher/researcher, I used interpretive methods in technology-rich, middle school classrooms to study gender-specific meanings for the technology tools used by students.

One of the major challenges of such a study is that it focuses on three moving targets: students developing from their formative years to adolescence, a culture with evolving and changing gender roles, and, as Volman and van Eck (2001) indicate, an evolving and changing computer culture within educational settings. The term computer culture emerged in the mid 1980s and was used commonly in the literature on technology and gender by the early 1990s. Its origins stem from the work of Turkle (1984) who identified two different computer programming styles, that of hard masters and soft masters. Hard masters tend to be male and soft masters tend to be female. “In our culture girls are taught the characteristics of soft mastery--negotiation, compromise, give-and-take, while models of male behavior stress decisiveness and the imposition of will” (Turkle, 1984, p. 109).

In 1990, Turkle and Papert argued that, within the computer culture, we must accept the “validity of multiple ways of knowing and thinking” (p. 113). They discuss two major approaches to computer programming: the dominant, structured approach used by “planners” (often associated with males) and the more suspect artistic, intuitive approach used by “bricoleurs” (often associated with females). Turkle and Papert labeled this concept epistemological pluralism; they called for the development of a new computer culture which “would require a new social construction of the computer” (1990, p. 133), which would be, in turn, more inclusive than the existing male-dominated culture. They cited the work of feminist scholar, Gilligan (1982), who questioned the “idea of one privileged, mature way of thinking” (p. 123) as parallel to their view of “the computer as a projective screen for different approaches to knowledge” (p. 134). And finally, these researchers stated:

Feminist scholarship could make a crucial contribution to the (until now) male computer culture by promoting the recognition of the diverse ways that people think about and appropriate formal systems and by encouraging the acceptance of our profound human connection with our tools (Turkle & Papert, 1990, p. 136).

More recently, Herring (1999) delineated communication styles of males and females in cyberspace. The male style is characterized by adversity while the female style is characterized by supportiveness. This leads her to suggest that men and women are indeed creating different electronic cultures.

A review of empirical studies on gender and computers conducted between 1984 and the present paints an overall picture of male dominance. Not only are females alarmingly underrepresented in computer science and technology fields, girls continue to view “a computer person as male and antisocial” (AAUW, 2000, p. 2). The most recent AAUW study, *Tech Savvy: Educating Girls in the New Computer Age* (2000), which gathered data from 900 teachers and 700 middle and high school girls, found that girls still see computers as associated with the male computer nerd. Further, they report that girls say, “We can do this, we’re just not interested.” Girls wish to change the computer culture, rather than change for it. This report indicated a need to take girls’ views seriously and transform the existing computer culture by integrating the insights of girls and women into this emerging culture. Finally, they found that such a transformation needs to focus on increasing technological fluency for girls and women, not simply as consumers or end users of technology, but as designers, leaders, and shapers of the computer culture (AAUW, 2000).

Turkle (2003) states “the computer culture is still, in the main, made by engineers for engineers and by men for men” (¶ 1). In feminist research, computing is portrayed as reflective of male characteristics of aggression, competition, and dominance (Winkelman, 1997). This tendency is found in elementary classrooms where boys tend to dominate computer use and often crowd girls out (Elkjaer, 1992; Inkpen, Booth, & Klawe, 1992; Sadker & Sadker, 1994). By broadening our definition of computer culture so it is more inclusive of female voices, we would invite more girls to participate more fully in that culture (Turkle, 2003).

Three times as many boys as girls participated in summer computer camps, and parents were more likely to purchase computers, computer software, and peripherals for boys than for girls. Males used computers more than females, especially for programming and game playing. By high school, the gender gap in computer use was even more pronounced. Boys were more likely to own a computer, understand the electronic operations of computers, and be part of extracurricular computer classes. Lack of female role models, gender-stereotyped computer course materials, and male-oriented names of computer science courses also contributed to students’ existing connotation of computers as male domains (Schofield, 1995). The trend continued at the university level where, in an introductory computer course, more than half the males used the computer lab after hours while almost none of the females took advantage of this opportunity.

At all levels, boys were more likely to be chosen to assist the teacher with technology than were girls (Sanders, 1990). Christie (1995) and de Castell and Bryson (1998) observed that girls generally enjoyed computing less than boys because most available software appealed to boys rather than to girls; the software used gaming formats that were competitive and often violent and which pitted two players against each other or one player against the computer. Girls preferred to explore feelings, solve problems, and work cooperatively and interactively at the computer. They also preferred adventure, friendship, or creativity as the focus of software (AAUW, 2000; Fiore, 1999). And finally, male teachers used computers more than female teachers at the elementary, secondary, and university levels (Hattie & Fitzgerald, 1987). Therefore students lacked female role models in this domain.

Gender stereotyping attitudes would appear to be prevalent (AAUW, 2000). When surveying 1,600 kindergarten through grade 12 students, Wilder, Mackie, and Cooper (1985) found that both boys and girls considered computers as more appropriate for males than females. When asked to draw a computer user, both boys and girls were more likely to draw boys/men in this role (Martin, Heller, and Mahmoud, 1992). Gender stereotypes were reinforced by parents, peers, and the educational system

(Walkerdine, 1990).

This cultural gender bias is found extensively in advertising and is perpetuated through advertising (Cooler, 1986; Nye, 1991). Although this trend has begun to change in the last five years, technology advertising is more likely to picture a male “computer nerd” or “computer geek” than a female computer scientist. Similarly, computer users tend to be pictured as females. Margolis and Fisher (2002) reported that women and girls are using computers and the Internet in equal proportions to men and boys, but few women and girls are learning to invent, create, or design computer technology. The old adage that boys make things and girls use things that boys make is still unfortunately true (Margolis & Fisher, 2002). The perception that males are programmers and females are users is captured well in a recent Microsoft News Event. The caption under a picture of Bill Gates reads: XP called an operating system even your mother would love. The implicit meaning, however, is that male computer scientists have made XP so simple even a woman can use it.

The lack of female-in-control of technology examples, coupled with the plethora of female-needing-help using computers examples deters girls from exploring computers and computer-related careers. One further deterrent for females is the use of sex as an advertising tool. A controversial Palm Pilot advertisement pictured front and back views of a nude female figure holding a Palm Pilot. Such advertising degrades females and discourages them not only from using the technology tools that are available today, but also from choosing to become participants or leaders in technology-centered careers.

Kramer and Lehman (1990) contended that the male-as-computer-programmer image was accurate when computers were nothing more than number-crunching machines. With the rapid changes and advancements in technology, however, the presumption that maleness and computers are closely related domains contributes to an “increasingly inaccurate portrayal” (p.170) of computer use in the 1990 and 2000s. Hoyles (1988) summed up this tendency succinctly: “computers tend to be conceptually assimilated to the category of science, mathematics, and technology and acquire some of the traditional qualities of differentiated interest amongst boys and girls” (p. 10). This outdated view of computers, which disadvantages any “non-logical” person, and women are perceived to be highly represented in this category, serves to reinforce the bias that women are less competent and confident with computers than males.

Turkle and Papert (1990) called for a new social construction of the computer to contribute to our understanding of the ways males and females think about and use computers. After reviewing ten years of research on gender, ethnicity, and social class differences in the uses of computers in K-12 classrooms, Sutton (1991) concluded that there is a need to understand more fully the complexities of inequities in computer use in schools. This study answers these calls.

Project Description

This paper describes a university-middle school partnership involving 250 middle school students from twelve schools. Students were bussed to a nearby urban university where they had ready access to computers and the Internet so they could complete a web-based unit on cloning. The unit was team-taught by a middle school teacher and a university professor. The students benefited from access to technology, and the university professor was able to conduct a qualitative research study on gender and technology with these middle school students.

The focus of this study was not to investigate further the perceived gender gap surrounding technology, but rather to address the meanings that adolescents assign to computers as they interact with them. Since our culture is experiencing evolving and changing gender roles, and, since the computer culture within educational settings is evolving and changing, it is appropriate that this study addresses how today's adolescents view and use computers within an educational setting.

In my role as teacher/university researcher, I team-taught a technology-rich social science unit to 250 middle school students. My teammate was a seventh- and eighth-grade language arts/social studies teacher from a local K-12 district. Together we worked with each group of 25-30 students for approximately eight to ten hours in four separate sessions. Our classes took place in a university computer lab, so each student had access to a computer. Despite this one-to-one ratio of computers to students, students frequently collaborated both on and off the computer.

All students in multi-age seventh and eighth grade language arts/social studies classrooms in the K-12 district participated in this study. Students' mean age was 12.5 years. The project participants were approximately 50% males, 50% females. Students were:

- 75% Caucasian
- 18% Hispanic
- 5% Asian American
- 1% African American
- 1% Native American

The classroom was structured around seventh and eighth grade language arts and social studies standards that focused on problem solving, critical thinking, reading, writing, viewing, and presenting. Technology was the tool that helped us integrate student learning. In our classroom, we used a student-centered approach that viewed learning as a social process and learners as active participants in their learning and therefore responsible for their own learning paths. Students constructed individual knowledge in an environment that featured collaboration as well as feedback from peers and teachers. Our classroom was grounded in the following principles:

- Learning is an active process facilitated by an environment that encourages risk-taking, creative thinking, and critical thinking;
- Teachers create such environments to facilitate learning and to provide opportunities for self-reflection and self-evaluation;
- Learning is social and is fostered by collaboration;
- Learners learn by doing within specific contexts;
- Learning is reflective and incorporates feedback from teachers and peers;
- Students and teachers learn through their mistakes; and
- Technology is a tool to facilitate learning and is NOT the focus of learning.

Methodology

In her qualitative dissertation on computers, gender, and education, Borgo (1993) concluded:

The research community exhibits considerable homogeneity [that] has produced a literature that emphasizes broad-brush, survey-based data gathering techniques, quantitative analysis, and statistically based interpretations. Future research will benefit from the inclusion of ethnographic . . . perspectives, the development of an integrated theoretical model, and more in-depth research within the schools. The voices of children are conspicuously absent from this body of research and warrant attention (p. iii).

This study was designed to respond to this observation. It focused on children in a classroom setting, advocated an ethnographic perspective, explicated the theoretical stance I took, and most importantly, provided a forum in which children's voices were clearly heard.

This qualitative research can be characterized as collage research as I looked at a wide variety of data that addressed the meanings that adolescents assign to computers and the ways they use computers. My data sources included open-ended student surveys about students' uses of and attitudes toward technology, observational data and field notes, documents created by students, reflection logs, and student responses in structured focus groups (See Appendix A). Students completed surveys (See Appendix B) prior to the start of the project. Observations, associated field notes, and digital photographs were recorded throughout the project. Student products and reflective logs were collected at every step of the project. At the completion of the project, a number of structured focus groups were conducted with the students. Focus group responses were recorded and transcribed.

All data were analyzed using a constant comparison method, not in the sense that Glaser and Strauss (1967) used this method to derive theory, but simply to sort through and process the data. I recursively used the first two steps that Glaser and Strauss suggest that researchers follow:

1. compare incidents applicable to each category
2. integrate categories and their properties

Data analysis started with reviewing all the data to determine if and where there was evidence of gender differences. Then HyperQual2 was used to tag and sort data. Finally coding, counting, and tallying of relevant categories was done in order to paint a picture which reflected the participants' understandings of computers and the meanings they assigned to the construct, computer.

In terms of my general approach to data analysis, I first looked through the raw data for divisions along gender lines. But my examination did not stop there, as I considered no gender difference as interesting as gender differences. I noted same-gender and cross-gender interactions in an effort to understand how these adolescents viewed and used computers. I followed the model of Gilligan (1982) who presents female and male voices to highlight the differences between two ways of viewing experiences rather than suggesting generalizations about either gender.

A descriptive study like this one is not concerned with generalizability, internal and external validity, reliability and objectivity in the same way that experimental studies are. The goal of descriptive studies like this is not universal, context-free generalization; rather, the goal is trustworthiness. I make no claim that my research interpretations will hold true for all children in all settings. I do claim, however, that my

study is trustworthy and generalizable in the sense that I have provided sufficient detail about both the study and my theoretical stance that readers are able to draw inferences about the applicability of my study to their particular situations.

Lincoln and Guba (1985) suggest that trustworthiness can be judged by four criteria: credibility, transferability, dependability, and confirmability. I establish credibility by prolonged engagement in the field; transferability by providing information from multiple sources, including observations, surveys, student reflections, and student focus groups; and dependability and confirmability by maintaining an audit trail of my synthesis of the raw data.

Findings

Based on observation and a computer literacy evaluation administered to participants, all of the adolescent girls and boys in this study were competent, confident, and frequent users of computers, computer software, and the Internet. Despite their equivalent competence, confidence and frequency of use, girls and boys viewed and used computers differently. Each gender seemed to accept this as a natural part of its culture, and, in general, was accepting of each other's visions and uses.

In terms of definitions, girls saw the computer as much more multi-dimensional than did boys. The phrase "it's whatever you want it to be" best captures this understanding. Girls defined computers as multi-use tools that facilitate connecting with friends, doing homework and research, gathering information, solving math problems, organizing ideas and information, producing more professional products, and accomplishing a multitude of tasks in quicker, easier ways. Boys, on the other hand, had a more narrow view of computers. Boys identified computers as machines, toys, or high tech calculators that let you do things quicker and easier. It is interesting that no girls used the terms machine or toy in defining the computer. Rather, they focused on what the computer allowed them to accomplish. The major foci for girls, in order of importance, were computer as communication tool, computer as productivity tool, and computer as multi-purpose tool. The major foci for boys, in order of importance, were a machine for entertainment and gaming, a thinking machine, and an information machine.

In terms of general use, girls utilized computers to connect with others, and boys used computers to compete with others. Girls' most predominant uses centered on communication: emailing friends and family, chatting with friends, making new friends, using instant messaging to communicate daily with classmates, and connecting to and flirting with guys. Boys' most predominant uses centered on competitive, often violent, gaming activities such as war games, killing simulations, and sporting games. In terms of school-related use, girls focused on the numerous ways they used computers, including word processing, creating multimedia presentations, writing multiple drafts of papers, and producing neat, professional looking work. Boys, however, mentioned that they used computers for homework and schoolwork only now and then, and the only tool they mentioned was the Internet.

In terms of Internet use, each gender identified several uses not mentioned by the other gender. Girls said they used the Internet to shop or browse for fashion ideas. They also focused on using the Internet to flirt with guys or see pictures of "handsome hunks." Most girls played computer games not at all or

only when they were very, very bored. They then elaborated that they thought computer games were a bad influence on their male classmates because gaming made the boys into anti-social couch potatoes who did not know how to communicate with their female classmates. Boys mentioned using the Internet to look up codes for various games that would allow them to move to the next level of the game. And several boys mentioned their sophisticated use of computers to create FTP sites for other gamers to find codes and secrets for popular software and Internet games.

An interesting and unexpected trend that I discovered when analyzing data was that girls used more exact language to describe computer use than did boys. For example, boys said they used computers for homework; girls specified that they used word processing, PowerPoint, and the Internet to do homework. Boys called the computer a machine that allows you to look up stuff, while girls said it was a resource tool for learning. Boys were less specific about their uses than girls. For example, boys never mentioned how they did homework, while girls mentioned how they used word processors to do multiple drafts and how using the computer made their work look neater and more professional. And even though both boys and girls mentioned the convenience of computers, they chose different language to express this idea. Boys used the generic "it" when they said "it let's you do things quicker and easier;" girls identified the computer as a tool when they said "it's a tool that helps you work quicker."

Figure 4 delineates the exact phrases adolescent girls and boys used to define the term computer.

Girls' Definitions

Something to keep you connected to your friends
It helps you communicate with others
A tool that does things that you tell it to do
A lot of stuff combined into one thing to make life easier
A gateway to information
It can substitute for a book because it contains so much information
It organizes and stores your thoughts
It's a resource tool for learning things
It can communicate, it can do problems in math, and it can write
It improves your everyday life
A tool that makes your work look neater and more professional
A tool that helps you work quicker
It's whatever you want it to be

Boys' Definitions

A machine with a CPU and a motherboard and circuits
A high tech calculator, a giant calculator
A machine that does what you program it to do
A machine that thinks for you
A machine that processes information and stores it
A toy for people to have for entertainment
A machine that does things faster than a human can
A machine that allows you to look up stuff
It lets you do things quicker and easier.

Figure 4: Adolescent Girls' and Boys' Definition of "Computer"

Figure 5 delineates the exact phrases adolescent girls and boys used to describe how they used the computer.

Girls' Uses of Computers

Word processing for homework and research
Word processing for writing process to easily do lots of drafts
PowerPoint presentations for classes
Email to talk to friends both locally and at a distance
Chat rooms to keep in touch with friends and make new friends
Instant messaging to talk to classmates
Email to talk to guys and flirt with guys
Games to play if I'm really, really bored, like PacMan or Solitaire
Definitely NOT for games
The Internet to shop or "window shop"

Boys' Uses of Computers

Mainly for fun, maybe some homework now and then
To play games (Solitaire, casino games, sporting games, logic games, simulations where you kill people, war games)
Entertainment 24 hours a day
The Internet for information to do homework
The Internet for Nintendo codes
Run an FTP from my computer that's up 24 hours a day

Figure 5: Adolescent Girls' and Boys' Uses of the Computer

Kantrowitz (1999) found that the gender stereotypes we perpetuate within our culture (boys play Nintendo, girls play with Barbie) lead to an association of males with computers, thereby creating a male-dominated computer culture. She suggests that to eliminate gender stereotypes within the computer culture, we must eliminate them from our culture at large. This charge, I believe, is being led by young women themselves who are refusing to be left behind as a new virtual world emerges.

Within this study, I found a number of stereotypes that seem less strong than they once were. For example, as illustrated in Figure 6, males are more likely to take control of the mouse than are females, but many young females are comfortable taking control of the mouse.



Figure 6: Breaking Gender Stereotypes Regarding Mouse Control

As shown in Figure 7, females enjoy and use collaboration for computer-based assignments, but males also enjoy and use collaboration as a learning tool.



Figure 7: Breaking Gender Stereotypes Regarding Collaboration

And there was evidence of the evolving, often confusing gender roles of girls and women in the world of computers, as shown in Figure 8.

“I’m fourteen years old and alls I’m interested in is boys. I’m not SUPPOSED to be interested in computers and the Internet and stuff like that.”



“I can’t believe it! I’m really enjoying using the computer!”

Figure 8: Evolving Gender Roles Regarding Computers

The gender differences surrounding technology are not differences in competence, confidence, or frequency of use. Instead, the differences lie in how adolescent girls and boys view computers and the way they choose to use them. It is imperative, then, that K-12 teachers understand that the culture of computer use in schools is changing. Females are embracing technology in numerous new ways as computers evolve into more versatile and complex tools that can be used in a wide variety of ways depending on the user.

Because there is a pervasive perception that the computer domain is male, parents and teachers need to work to disrupt the stereotypically gendered nature of technology. In general, technological use is often dictated by a rigid gender ideology: vacuum cleaners, washing machines, and electric typewriters are for females; power saws, tractors, and household tools are for males. But computers, although far from neutral, offer a way to interrupt and re-define gender differences. Technological advancements have changed both the computer and the image of the computer. Computers are no longer simply number crunchers; they are now multifaceted technologies that facilitate unlimited opportunities in application, use, and vision. Males may have aligned themselves with a number crunching computer in the past; but the newer image of computer as more complexly functional opens the door to differently gendered use. In fact, this study stands as firm evidence that girls are aligning themselves with computers and are using computers to defy long-standing gender stereotypes.

Implications for Classroom Practice

A delineation of classroom strategies that will ensure that both girls and boys use computers in ways that enhance learning and growth is a topic of increasing interest. The first step, however, is raising teachers' consciousness about the inherent disadvantage girls have in the computer domain. Helping teachers become more aware of issues surrounding girls and computers can make a difference. A group of 240 teachers attending the Carnegie Mellon Summer Institute from 1997 to 1999 were trained in "gender equity instruction that would increase the numbers of girls taking high school computer science" (Margolis & Fisher, 2002, p. 109). These teachers reported the following changes as a result of the institute:

- Teachers were more aware of their own behavior that disadvantaged girls;
- Teachers made a greater effort to call on everyone in the classroom, not just the boys;
- Teachers personally made greater efforts to recruit girls into high school computer science classes;
- Teachers had a better idea of how to work with girls;
- Teachers worked harder to retain girls in their classes;
- Teachers encouraged girls; and
- Teachers considered issues of gender equity more (Margolis & Fisher, 2002).

I believe it is imperative that we welcome girls into the computer clubhouse (Margolis & Fisher, 2002) starting when they are infants in the home, then in pre-school, then in elementary school, and so on. If we wait until girls are in high school, we are too late. By then, they may have chosen not to take the courses necessary to become inventors and developers of the emerging computer culture. By then, their natural curiosity about how and why things work may have been destroyed. By then, gender stereotypes may be too deeply engrained for girls to feel comfortable moving into a male-dominated culture. We, as parents, teachers, and school administrators can make a difference in how the computer culture emerges during the next decade if we employ any or all of strategies and classroom practices described below (AAUW, 2000).

Parents, teachers, and school administrators can insure that both girls and boys are using computers in ways that facilitate learning and that honor each gender's way of viewing and existing within the new and emerging computer culture, by using any number of the following suggestions.

How parents and teachers can help:

- Establish same-gender classes in math and science;
- Establish girls-only computer clubs, summer camps, science fairs, discussion groups, online meeting places, or similar opportunities;
- Simultaneously, create environments where boys and girls can work comfortably together with computers;
- Establish mechanisms within your home or school to allow for equitable access to computers by both boys and girls;
- Place computers in homes and schools in central locations that discourage inappropriate uses and encourage collaboration among all family members or classmates;
- Provide numerous female role models who not only use computers in meaningful ways,

but who are designers, leaders, and shapers of the computer culture;

- Use technology in the home and classroom to accomplish real-life, meaningful objective and goals (i.e. when you need to process or analyze data you've collected, use a spreadsheet and discuss ways in which spreadsheets are helpful tools, so that all students see the computer as something other than a word processor);
- Establish a mentor program where female engineers and computer scientists interact on a regular basis with elementary, middle, and high school girls;
- Provide all students with information of the courses and types and levels of education needed to pursue careers in computer science, engineering, and other computer-related fields;
- Choose software that does not alienate girls, is not violent or overly competitive, and does not promote gender stereotypes;
- Expand your definition of computer literacy to that of information literacy;
- Understand that students learn by doing, so that the more opportunities they have for using computers in multiple context to accomplish a variety of goals, the more computer-savvy they will become; and
- Work collaboratively with other teachers in your grade level, your building, or your district to create computer-based materials (i.e. WebQuests) that honor multiple ways of viewing and understanding important concepts in each curricular area and at each grade level.

How administrators can help:

- Support parents and teachers using any of the strategies or practices listed above;
- Provide numerous opportunities for in-depth and long-term staff development for your teachers that go beyond the how-to and focus on ways to integrate technology in classrooms to engage students in critical thinking, problem solving, and higher-order thinking skills;
- Allow teachers (the majority of whom are female at the elementary school level) to take computers home over the summer, so that they are comfortable using computers to accomplish personal goals. Only then will they feel comfortable using technology as an integral tool in their classrooms;
- Create site-based technology integration specialists (teachers who use technology especially well in their classrooms) to mentor and support other teachers striving to use technology more effectively in their classrooms; and
- Create school- and district-wide policies and standards that disallow the use of technology to put down, harass, or malign fellow students.

When parents, teachers, and administrators become more aware of the issues discussed in this paper, when they use computers in their own lives, when they have in-depth technology integration training, and when they use some of the strategies and practices outlined above; then, and only then, will we make a substantial difference by enlarging the computer culture to embrace both boys AND girls.

Implications for Future Research

Turkle and Papert (1990) called for a new social construction of the computer as well as feminist

scholarship to contribute to our understanding of the ways males and females think about and use computers. In this study a micro-culture emerged that encouraged new social constructions of the computer and the computer culture by both boys and girls. By closely examining the interface of girls and computers, and boys and computers, I was able to gain insights into how each gender views and uses computers.

This study breaks ground for future studies to create, and simultaneously study, computer cultures that honor female and male ways of knowing and that allow the research community to begin to break down gender stereotypes and the idea of one privileged (usually male) way of thinking about computers.

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Appendix A: Focus Group Questions

What was the most significant aspect of the technology workshop for you? Why?

What was the least helpful aspect of the technology workshop for you? Why?

What is a computer? How and why are computers used?

What is multimedia? How and why is multimedia used?

What is the Internet? How and why is the Internet used?

Have you used the Project IDEAL website from home? If so, how?

Recent research indicates that girls and women are less likely than boys and men to be competent and

confident computer users. How do you feel about this issue?

Other recent research indicates that girls and women use computers differently and for different purposes than boys and men. How do you feel about this issue?

Did you observe differences in the ways boys and girls in your workshop used computers?

Did you observe differences in the ways boys and girls in your workshop thought about computers?

How do you view yourself in relation to computers?

How do you view yourself in relation to multimedia?

How do you view yourself in relation to the Internet?

How do you feel about competent computer users who are male?

How do you feel about competent computer users who are female?

If there is a difference, why is there a difference?

What other comments would you like to make about the experience?

Appendix B: Student Survey

Name _____ Date _____ School _____

How many computers do you have in your home? 0 1 2 3 more

How many years have you been using computers? 0 1 2 3 longer

How many hours per day do you use a computer? 0 1 2 3 longer

Please describe the ways you use computers at home.

Please describe the ways you use computers at school.

What is your definition of a computer?

How and why do people use computers?

What is your definition of telecommunications?

How and why do people use telecommunications?

What is your definition of the Internet?

How and why do people use the Internet?

Recent research indicates that girls and women are less likely than boys and men to be competent and confident computer users. How do you feel about this issue?

Other recent research indicates that boys and men use computers differently and for different purposes than girls and women use them. How do you feel about this issue?

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