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Gender equity and computer use

Raymond Rubalcava

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GENDER EQUITY AND COMPUTER USE

A Project
Presented to the
Faculty of
California State University,
San Bernardino

In Partial Fulfillment
of the Requirements for the Degree
Master of Arts
in
Education:
Instructional Technology

by
Raymond Rubalcava
September 2002
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ABSTRACT

As a teacher, the author of this project noticed that boys and girls in elementary school have different levels of understanding computers and their use. Is there gender inequality in computer use? Literature was reviewed on gender and computer use in order to investigate this question. Research demonstrated that gender inequality exists in the use of computers. This is because society constantly treats girls differently than boys. Advertisement and media exacerbate this problem for girls. A web page was created as a direct result of the research findings. The web page was designed as a gender equality resource for teachers to use. The web page includes classroom strategies, lesson plans, web sites for teachers, and more. The web site was evaluated for its usefulness and for the format it was presented in. Six teachers and the principal of Henry Elementary School in Rialto, California were the evaluators. Changes were made to the web page according to the suggestions given by the evaluation participants. The final web page was presented to the staff at Henry Elementary and placed in the school library as a resource for the teachers.
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABSTRACT</td>
<td>iii</td>
</tr>
<tr>
<td>CHAPTER ONE: INTRODUCTION</td>
<td>1</td>
</tr>
<tr>
<td>Statement of the Problem</td>
<td>5</td>
</tr>
<tr>
<td>Goals of Project</td>
<td>6</td>
</tr>
<tr>
<td>Overview of Web Page</td>
<td>7</td>
</tr>
<tr>
<td>Organization</td>
<td>8</td>
</tr>
<tr>
<td>CHAPTER TWO: LITERATURE REVIEW</td>
<td>10</td>
</tr>
<tr>
<td>Society’s Roles</td>
<td>11</td>
</tr>
<tr>
<td>Household Expectations and Stereotypes</td>
<td>13</td>
</tr>
<tr>
<td>Classroom Expectations and Stereotypes</td>
<td>14</td>
</tr>
<tr>
<td>Media and Advertisement</td>
<td>23</td>
</tr>
<tr>
<td>Internet</td>
<td>32</td>
</tr>
<tr>
<td>Possible Solutions</td>
<td>34</td>
</tr>
<tr>
<td>CHAPTER THREE: DESIGN AND DEVELOPMENT</td>
<td>39</td>
</tr>
<tr>
<td>Subjects</td>
<td>39</td>
</tr>
<tr>
<td>Equity Model</td>
<td>40</td>
</tr>
<tr>
<td>Gender Awareness</td>
<td>40</td>
</tr>
<tr>
<td>Web Sites for Teachers</td>
<td>40</td>
</tr>
<tr>
<td>Gender Test</td>
<td>41</td>
</tr>
<tr>
<td>Lesson Plans</td>
<td>41</td>
</tr>
<tr>
<td>Computer Schedule</td>
<td>42</td>
</tr>
<tr>
<td>Ideas for Parents</td>
<td>42</td>
</tr>
<tr>
<td>Classroom Strategies</td>
<td>43</td>
</tr>
<tr>
<td>National Technology Standards</td>
<td>43</td>
</tr>
</tbody>
</table>
CHAPTER ONE

INTRODUCTION

There is an existing gender inequity in the education of boys and girls. Although the educational system and specific classrooms may not create this inequity, they do exacerbate the gender differences and stereotypes created socially. This paper will show that gender inequity exists in the classroom and will demonstrate why it is detrimental to girls' future. It will demonstrate that generally the use and teaching of computers in the classrooms exacerbate existing societal gender inequity.

Why should this matter? This issue is particularly important as our society becomes more dependent on technology and on the skills to master this subject. If this inequity is not addressed, girls will be at an even greater disadvantage as they pursue careers that are more dependent on the use of technology. For example, The U.S. Department of Labor predicts a 90% increase in Computer Engineering and Computer Science jobs between 1994 and 2005 (Kirkpatrick & Cuban, 1998). A ninety-two percent increase in Computer Systems Analysis jobs is also predicted. This is a great opportunity for both men and women. However, the labor force in Computer Sciences is
currently made up of 25-33% females and 67-75% males. Why do males outnumber females by 3 to 1 in the field? Although there are many factors, classroom exposure to technology is clearly an important one.

Technology is now playing a major role in the job market, and it will play a bigger role in the future. Since the future job market is going to rely heavily on technology, it is especially important that there is gender equality in Computer Education in schools. Without gender equality in Computer Education in schools, there cannot be gender equality in the future work force.

As was stated earlier, classroom education does not create gender differences, but builds on existing societal norms. One of the factors that make boys more interested in computers than girls is society. There are many stages of the same factor that boys and girls experience, depending on their age. The first stage is the role assigned to boys and girls by society even before they are born, which initially displays different expectations for boys and girls. Another stage is the roles learned by communicating with others. Boys and girls learn to act in a way that is acceptable to their peers. School is where the next stage is encountered for boys and girls. Boys and girls try to comply with the expectations from their
parents and, at the same time, try to fit in with their age group. By the time boys and girls are in high school, gender guidelines have been completely drawn. As a result the majority of the boys are more interested in computers than girls. Since the future is greatly dependent on Computer Technology, girls are being hindered by society to become part of the technology workforce of the future.

Of course, this is not true of all children, all families and all communities. However, the literature review does indicate that there are stereotypes of what is expected of boys and girls. Before birth, society has already placed different expectations for boys and girls. When the birth of a boy is expected, the family gets ready for the new arrival by decorating the boy’s room in blue. The birth is then celebrated with the passing out of cigars, a symbol of manhood to come. When the birth of a girl is expected the family gets ready in the opposite fashion than with the birth of a boy. The family decorates the new arrival’s room in pink. The birth is then celebrated by passing out chocolate, the symbol of sweetness to come.

As the infants start growing into toddlers, the boys are allowed to play rough and explore in the mud. The exploration part of play allows boys to grow confident
with new experiences. The toddler girls on the other hand are expected to look pretty and not mess up their hair or their neat and tidy clothing.

When toddlers reach school age they also experience biases. In elementary schools there are conscious or unconscious gender biases that occur in many classrooms. When teachers and students interact in classroom discussions, the teachers expect that certain students will provide the right answers (Gipson, 1997). Studies show that boys are spoken to more frequently in the classroom and they are asked more higher-order-thinking questions than girls. When students do projects the teachers provide instruction to the boys on how to complete the project while they tend to show the girls how to do the project. By doing this the teacher is hindering the girls from developing skills that they need in daily life while the boys sharpen their abilities with each project. Even though this type of gender bias is done unconsciously, the result is disadvantageous to girls.

Boys and girls learn to act in a way that is acceptable to their peers. Beginning in elementary school all the boys want to have the same type of cartoon character backpacks just to be part of a group. Many times if the boys do not look or act like their peers they can
become outcasts from their groups. When boys and girls impersonate their peers they are acting out gender stereotypes.

The same type of pattern develops with girls starting in elementary school. Most of the girls want to look pretty and want to add the latest “Barbie” backpack to their school gear. Boys and girls confront a lot of trouble trying to incorporate in their peer groups. Once they are accepted they have to continue to change to what is acceptable by the group at that particular time. Boys and girls change to assimilate.

Statement of the Problem

As a fourth grade teacher and author of this project, observations were made that showed discrepancies in what boys and girls perceive to know about basic computer operations and what they actually do know. Other observations led the author of this project to believe that boys are more interested in using computers than girls. The boys give up their recess time to use the computers and they also give up their time before school starts to use the computers. The boys wait for their teacher at the door and as soon as the door is opened they rush towards the computers. When girls go to the class in
the morning they come in quietly set their belongings in their tray, put their homework on their desk and then look around to see if there is a computer available. If a computer is available, they find a friend and together they use the computer. Girls mostly use the computers during their assigned classroom time. Even though both boys and girls may have the same access to computers in the classrooms, it seems that the boys are more willing to work with computers than girls. These observations led the author to believe that there is gender inequality in computer use at schools. One of the problems that cause gender inequality is that teachers do not have sufficient training and gender equity knowledge. Teacher educators spend inadequate amount of time covering the topic of gender equity (American Educational Foundation [AAUW], 1998). The other problem is that most teachers unconsciously have a gender bias that affect how students learn. Research shows (Gipson, 1997) that boys are more frequently spoken to in the classroom than girls.

Goals of Project

One of the goals of this project was to make the teachers of Henry Elementary aware of gender inequalities and computer use. In order to accomplish this goal, an
informational web page was designed. The teachers became more aware of the gender inequalities in school and discovered what they could do about it by using the web page. The second goal of this project was for the teachers of Henry Elementary to become more gender balanced in their teaching. In order to accomplish the second goal, the web page provided teachers with lesson plans that helped with gender equality in their classroom. Many ideas were also offered on how to obtain gender equity in the classroom. The third goal of this project was to make the gender equity information easily accessible to the teachers at Henry Elementary. To accomplish this goal, the web page was placed in the school library where all teachers could access the information. The design of the web page was also simplistic in order to avoid any confusion in retrieving the information.

Overview of Web Page

An informational web page was designed to help teachers with the problem of gender inequality. The design guidelines for web pages by Ann E. Barron, Associate Professor at the University of South Florida, Brendon Tankins, Internet specialist, and David Tai, Webmaster for the Florida Center for Instructional Technology will be
followed (2001). The web page will include a self-analyzing questionnaire (see Appendix A). After completing the questionnaire the teachers can find out if they have a tendency to become gender biased in their classrooms. There will be twelve links in the informational page with numerous ideas on how teachers can ensure that both boys and girls are given the same opportunity in these teacher’s classrooms. The links have the following titles: Equity Model, Awareness, Strategies, Web Sites for Teachers, Gender Test, Lesson Plans, Computer Schedule, Ideas for Parents, Classroom Strategies, Web Sites for Girls, Research, and National Standards. Chapter three will include more details about each link.

Organization

The literature review in chapter two will show gender inequality in society and computer use in education. As boys and girls are growing up, they are faced with gender stereotypes by society. The stereotypes begin at home then continue at school. Throughout a boy or girl’s life they encounter gender stereotypes through the media and advertisement. The literature review will also show why it is detrimental to all girls’ future not to have an equal
balance in gender and computer use. This project is significant because it will shed light on the gender inequality problem and offer suggestions on how to prevent gender biases in the classroom.
CHAPTER TWO

LITERATURE REVIEW

Why is it that girls and boys demonstrate different interest in, and use of, computers? Research demonstrates that boys use computers more, while girls tend to be less interested. There are numerous factors that can explain this. One is society and the different roles and expectations attributed to boys and girls from a very young age. Another factor is the families' expectations of girls and boys that encourage on the stereotypes propagated by toys and the media, etc. One other factor is the bias in computer programs and the Internet. There is also bias in the classroom, which teachers, willingly or not, exacerbate in the way they teach and interact with both genders.

This chapter will look more closely at some of the factors that create this problem of different expectations for boys and girls, in the classroom setting. It will also offer a model program that serves as a useful example of how schools can change and begin to address the gender gap and inequity in computer usage for boys and girls. Finally it will inform the reader of some of the positive changes
that are currently taking place as society struggles for gender equity in computers and education.

Society’s Roles

Society plays a significant role in making boys more interested in computers than girls. Depending on their age, there are stages of the same factor that boys and girls experience. Society has different expectations for boys and girls as soon as they are born. Society represented by parents, teachers, television, computer programs, and the Internet all contributed to gender biases that girls have to deal with all their lives. One of those stages entails roles and different expectations society has of boys and girls as they are growing up. School is the next stage; boys and girls try to comply with the expectations from their parents and at the same time try to assimilate with their age group. By the time boys and girls are in high school, gender guidelines have been derived. Society, by means of television and the Internet, plays a great role in defining how girls and boys should be using computers. All these factors make boys more interested in computers than girls. Because the future is greatly depending on computer technology, girls' chances of becoming part of the technology workforce of
the future are being hindered. To address this issue, we need to start new programs in schools that lead us to a society that has gender equity.

Human interaction and playing can generate gender bias. The difference between boys and girls begins at an early age. According to Nelson, parents still select toys, costumes, books and activities, playmates and guests for parties on the basis of gender (Nelson, 1997). The majority of boys play with electronic toys, while most girls play with dolls. Boys dress up for Halloween as Super Heroes while girls dress up as princesses. When boys and girls reach Kindergarten their gender roles have already been defined and their parents have played an instrumental part in helping their children identify with their own gender.

The books children read in Kindergarten have a gender bias. There is twice the number of male characters than female characters. The images of female characters are often negative while the images of males are often positive. One example would be in the popular Bob the Builder books for kids (Randall, 2002). Bob is a talented construction worker that can fix anything. Bob is always shown to be a problem solver. He is a positive image for boys. On the other hand Bob’s helper Wendy, is a female
and is portrayed to be a step below Bob because all final decisions have to be made by Bob. Wendy is always getting Bob coffee and she is not a good problem solver. Wendy’s character is not a good role model for girls to follow. Therefore, books that are suppose to be educational for kids can sometimes also teach gender bias.

Household Expectations and Stereotypes
A study done by Shashaani (1994) consisted of a computer attitude survey with 39 items to measure students’ attitudes towards computers. There were three categories of questioning: computer interest, computer confidence, and computer stereotypes. There were also questions designed to survey the students’ perceptions of their parents’ sex-stereotyped attitudes and parental encouragement or discouragement to become involved in computers. The study showed that children tend to grow up and have the same attitudes as their parents. They grow up playing social roles that their parents interpret as appropriate. Therefore, girls have little confidence and show low interest in computers because their parents set a negative gender stereotype of computer users. Parents set these biases sub-consciously and sometimes consciously. Girls might not want to use computers because it might
feel like that they are disappointing their family. These gender roles that have been defined, even before the child is born, affect how boys and girls perceive the educational value of using computers. The same study by Shashaani (1994) shows that the fathers' gender stereotypes encouraged their sons' computer interest and it allowed the sons to believe that computers are for boys. At the same time, this reduced the daughters' confidence of working with computers and encouraged gender-stereotyped views about computer users. The study also found that the mothers' belief that boys, and not girls, should use computers also encouraged computer interest in the son and discouraged the daughter from using computers. The mothers' beliefs also led the son and daughters to have strong gender-stereotyped views of computer users. The study concluded that gender differences in computer attitudes is essentially social and cultural and not related to inner ability. Society needs to become more gender sensitive to prevent gender bias in computer use.

Classroom Expectations and Stereotypes

Not only are there biases among the students in school, but also in the classroom. In elementary schools
there are conscious or unconscious gender biases that occur in many classrooms. When teachers and students interact in classroom discussions, the teachers expect that certain students will provide the right answers (Gipson, 1997). Studies show that boys are spoken to more frequently in the classroom and they are asked more higher-order-thinking questions than girls. When students do projects, teachers tend to provide the boys instructions on how to complete the project, whereas they tend to show the girls how to do it. It is possible that because teachers are under pressure to teach grade level standards that they are not aware of gender biases that might be occurring within their own classrooms. Currently, teachers receive an average of two hours of training in gender equity from schools of education. Teachers also receive little training on how to use technology in ways that create an equitable learning environment (Pope, 1999). In a national survey (AAUW, 1998) it was found that two-thirds of teacher educators spent two hours or less per semester devoted to gender equity. One-third of the educators spent one hour or less learning about gender equity. In that hour the professors primarily lectured or talked to their students about gender equity. Teachers have few tools to use in their classroom when it comes to
gender equity. This lack of practical solutions to gender equity education is a disservice to students of both genders and of all ages.

This disservice can be seen in cooperative groups in the classroom. One example is a study done by John Pryor, (1995) which demonstrated that boys, when paired up with girls while using computers, tend to dominate. The study involved 14 groups with different pairings. The pairings were six groups with similar ability and eight groups with mixed ability. Within these groupings they had two boy-boy groups, four girl-girl groups, and eight girl-boy groups. The 9-10 year old children were given tasks to accomplish on the computer. After completing the task they were given questionnaires. Some of the findings concluded that the girls did not have a desire to shut out their partner and monopolize the work. In every case where a boy was the more able partner, the typical pattern of work was that the more able boy overrode the less able girl and proceeded to solve the problem himself. For the boys, finishing the task was less likely to be questioned by teachers and a sense of purpose came from the achievement of the goal. For the girls, the goal was important if it had some application and seemed to be leading somewhere. The process was significant for girls because it enabled a
sense of sharing with a partner. Student grouping can be productive but careful planning and group dynamics have to be considered cautiously.

An ethnographic study of first-grade students (AAUW, 2000) found that females in mixed-sex groups were more likely to have their competence questioned, their work critiqued, laughed at, or publicly criticized. Girls were also likely to have their concentration interrupted by boys in the mixed cooperative group than those girls working alone or in all female cooperative groups. A qualitative study (AAUW, 2000) of 67 computer science students in eleventh grade similarly found that they receive more teacher support in all female environments than mixed groups. Girls seem to work better alone or in all girl groups. Boys like to work more on their own. If the boys work with girls they try to take over the project.

In the minds of many students, math is directly related to computer science and being successful in computers requires a good background in math. That is what a study done by Shashaani (1995) showed. The study involved 1,754 high school students from grades 9-12, who came from five public high schools in different geographic locations and represented different socioeconomic
backgrounds in Pittsburgh, Pennsylvania. The participants' ages ranged from 15-19 years, and they were predominantly white. A survey was given to get information about the students' mathematical background and attitudes towards mathematics and computer use. The results concluded that boys liked mathematics more than girls, although neither sex had a stereotypical view of math as being a male domain. The results for math attitudes in relation to computer attitudes showed that boys scored higher for computer interest than did girls. Boys also indicated that they had more confidence in their ability to work with computers. Regarding the stereotypical view of computers, the results showed girls more than boys believed that there is gender equity in the ability of using computers. The results also indicated that, for both boys and girls, a liking of math was positively correlated to computer interest. Students' interest in math was also positively related to their confidence in working with computers. In the case of math confidence, there was a positive correlation observed between students' confidence in their ability in mathematics and their interest in computing. The survey also found significant differences between the sexes in relation to attitudes towards mathematics. Females in general were less interested and had lower
confidence in mathematics than males. There was also a link between math confidence and computer liking. The relationship indicated that those students who had more confidence in their ability in mathematics were more interested in using computers and felt more confident to work with computers (Shashaani 1995). Parents and teachers need to encourage girls in math and in turn they will become interested in computers.

As boys turn to men and girls turn to women, the gap in their computer use widens (Kirkpatrick & Cuban, 1998). For example, males tend to take more computer classes than females in high school. Males also use computers more often in their spare time. Many times males join school clubs that have access to computers. Males also use computers at home more than females. Females tend not to stay on computers as much as males do. As the gender gap increases so does the males' achievement and attitude towards computers. Males become more confident in their ability to use computers.

The Advanced Placement Test in Computer Science is a college-level course covered in AP high school classes. The data from 1999 revealed that a total of 11,793 students took the Computer Science "A" Exam (AAUW, 2000). Of these students 83 percent were males and only 17
percent were females. The more difficult Computer Science "AB" examination revealed that males comprised 91 percent of the test takers while only 9 percent were female. The results of the test showed that 41 percent of females test takers scored the lowest grade of "1," compared to 28 percent of the male test takers. The highest grades or a "5" were received by 10 percent of females and 17 percent of the males.

Within the societal environment that creates these gender stereotypes, what roles do teachers of Math and Computers play? A study by Groundwater-Smith, and Crawford (1993) concluded that a high proportion of persons responsible for the management of school computing resources were from Math/Computing areas of education. Eighty percent of the computer coordinators were male. They also found that across the curriculum, the proportion of confident staff users ran 2 to 1 in favor of male teachers.

The findings also revealed that there is a lack of awareness on the part of teachers that boys have a much higher level of computer home ownership and usage than girls do. If a teacher believed that female students have the same access to computers as their male counterparts, the teachers may not be correctly meeting the needs of the
students. The teachers’ beliefs regarding computer usage of their students represent an important factor in the study of gender inequality. Other results from the same questionnaire by Groundwater-Smith and Crawford indicated that of those schools surveyed 41% labeled girls as “Power Users,” while 71% labeled boys as “Power Users.” The term “Power Users” was used to describe students who had ability in computer programming and mastery of various computer applications (Groundwater-Smith & Crawford, 1993).

When the teachers allow students to select their own partner for a project they are encouraging gender segregation. Girls will pair up with girls and boys with boys. If the teachers allow students to assign themselves roles in-group work it may encourage stereotyping girls as the “secretaries.” Teachers should assign the roles and alternate the roles frequently to avoid gender segregation (AAUW, 2000).

In a research article by Christie Alice Atkinson, (1997) it was found that gender biases in the classroom are more invisible and difficult to eliminate than the author expected. Atkinson believes that a feminist perspective is essential, but insufficient, in eliminating the culturally embedded, long-standing gender biases
pervading schools and lives. In her study, she took the role of teacher/researcher and she offered three intensive telecommunications workshops to elementary school students. Twelve children, with an average age of nine years and one month, attended the workshop. Atkinson believed that the majority of her interactions with children reflected egalitarian behavior. However, when she analyzed her data it was evident that there was a discrepancy in two areas. The two areas where gender bias was evident were in the topics of her written and verbal interactions with the children. Choosing a quiet, capable, and cooperative girl to be her classroom assistant reflected her own gender biases. The girl that was chosen was then locked into her role of assistant without thinking of herself as an academic risk-taker. She was trapped and her potential for growth was endangered. Atkinson also allowed the bright boys to ask more questions, demand more attention, and dominate the classroom interaction. As a teacher she asked the class for ideas on topics the class might like to search for. A boy jumped out of his seat, wildly waving his hand and called out, “Chess, let’s look up chess.” The other boys immediately agreed to his request and the girls silently nodded their heads, giving in to the boys. Atkinson also
found that she was spending more time interacting with individual boys than with girls. The following are other areas in which she found gender biases: she spent more time with the boys - two to three minutes - while the time spent with the girls was 15 to 40 seconds; she provided differential help, by helping boys achieve a goal versus doing the job for the girls; she praised boys for their brains and cleverness and praised girls for their cooperation, attitude, effort, and occasionally for their brains and cleverness. Despite Atkinson’s belief that she was giving equal treatment to both genders, she recognized, after coding, counting and timing her interactions with her students that she had been bias towards students (Atkinson, 1997).

Media and Advertisement

Society, by means of computer programs and television, also creates a gender discrepancy that keeps widening the gender gap. Girls are constantly viewing messages on the Internet that belittle their gender. Educational magazines, commercials, and many types of advertisement are constantly suppressing females. These messages are part of how society treats females in technology as less valued than males.
As educators begin to give equal access of technology for both boys and girls, the problem of misrepresentation continues to exist. Advertisements still portray females in supportive or even helpless roles through technology (Knupfer, 1998). While males are shown using technology in productive ways that benefit their careers, females are portrayed as sexy decorations or supportive nurturers for someone else’s needs. Most advertisements make it seem natural for men to dominate the scene and for women to be subordinate within it. The stereotypical gender depictions begin early in life, with images of children, and carry through to the portrayal of adults. Boys are shown in confident poses using computers to gain knowledge and win. Girls are shown sitting at computers for decorative purposes. Another problem that exacerbates girls and boys attitudes towards computers is the gender stereotypes of computer programs and games. Many computer programs are biased toward girls. Some of them show boys as heroes while girls as needing to be rescued by the boys. A study done by Bradshaw and Clegg (1995) using an educational computer program with “androgynous” characters (creatures displaying humanoid features but with no clear gender indicator) demonstrates this bias. Bradshaw and Clegg found that children would assign gender to neutral
characters. One of the characteristics with which the kids identified gender was hair. Figures that had "spiky hair" or had no hair were identified as male, while figures with curls would be identified as girls. One of the girls in the study identified one of the figures as male because it looked like a soldier and it had big legs. The figure that was identified by kids as female was the heavyset character. The kids believed that the character was female because it was having a baby. Some of the activities in the computer game were also assigned gender roles. The characters that went close to the flowers were identified as females because, according to kids in the study, only girls like flowers. All the findings lead to girls not having positive identification with images or characters on the screen. As this study demonstrates, from an early age, girls learn that computers are associated with maleness.

Computers and computer programs have long been perceived as a male enterprise. The marketing of computer programs is directed to a male audience because they are the ones who purchase the majority of computer programs (Kirkpatrick & Cuban, 1998). Magazines advertising computers and computer programs have many times more males advertising products than females. Males also write the
majority of the articles featured in these magazines. Some of the computer programs offered in these magazines contain gender biases. A study of computer imagery (Binns & Branch, 1995) reveals that stereotypes are still within the computer environment. The study reports that clip-art images available in popular programs still depict men in leadership and authority roles and women are depicted in minor roles. Having only male positive role models adds to the gender discrepancy found in computer programs.

A review of popular mathematic computer programs intended for kindergarten-sixth grade showed that the gender identifiable characters were only 12 percent female. In that 12 percent that were female they played passive traditional roles such as "princess." Another study, reviewing 30 randomly selected software used in schools found that out of 3,033 characters in the software only 304 were female. Also women appeared more than men in categories of "domestic work" and manual labor. Eighty percent of the "leadership" characters were male and appeared in 90 activities opposed by only 55 activities for females (AAUW, 2000). Since the computer software caters mostly to boys by having action packed, scoring points, and winning situations in their games, it is no wonder that when games are available during recess 9 out
of 10 students are boys playing. If it has knocking things down the girls perceive it as just for boys and they don't bother with it.

The balance of gender inequality in computer programs is slowly changing (AAUW, 1998). In the year 2000 the most dramatic growth is expected in the computer entertainment market. The game industry is expected to have $400 million in sales. Only recently the game industry has begun to target girls as a virtually untapped market. Leading the way is Mattel’s interactive Barbie CD’s for girls. Barbie’s Fashion Designers is a computer game where the user can design and select clothes for fashion shows. This game sold half a million in its first two months. It is the biggest girl game in the market and the best selling children’s software ever. The Barbie CDs and other software designed exclusively for girls’ interest in mind are labeled “pink software.” Through the use of CDs that are designed with conventionally feminine roles and tasks girls can develop more of a comfort with computers. The American Association of University Women Foundation (2000) has a commission on technology, gender, and teacher education. In a qualitative study of 70 middle school and high school girls on the East Coast the girls were asked
to design their own computer game for girls and this is what they came up with:

* Rich narration and intricate, multi-level games
* Engaging characters (preferably females or non-gender, personalizable, and customizable)
* Roles involving positive social action (such as guiding characters through a set of puzzles or challenges)
* Challenge at appropriate level of difficulty
* Social interaction both on screen and between players and opportunities to build new relationships
* Opportunities to design or create
* Strategy and skill requirements

The girls in the focus group prefer games where they make things rather than destroy them. They also want games that simulate real life or adolescent experiences. Other games that girls would like to see are mentors or friends that they could get advice from on topics that adults might not want to discuss. Girls can learn how to overcome problems and fear through these computer games. A possible solution that can help in narrowing the gender gap is for computer programmers to design programs particularly for girls.
An examination of the print-based advertisement in technology products revealed a clear gender stereotype. The study sampled popular magazines and promotional material about multimedia technology that were available to teachers from direct mailings to schools. In these magazines, males were depicted as professionally competent people and females were depicted as serving others.

Knupfer (1997) found many examples of teenagers and young adults in advertisements that targeted schools about technology. In these advertisements, Knupfer found none that depicted females achieving school or career gains due to technology. One advertisement depicted a teenage girl wearing a red blouse and reading a book while sitting next to a computer. Its counterpart advertisement for a similar product depicted a teenage boy who was proclaimed to have discovered a "prize-winning formula," implying that he did so as the result of using computer technology.

Two technology advertisements were found in a 1996 issue of Educom. This magazine is for teachers who are interested in technology. The advertisements were for notebook computers by the same company. Both of them were in black and white. Two teachers represented the advertisement with the female characters. One was a middle-aged motherly-looking female and the other was
young and slender woman. The advertisement depicted both women just standing and doing nothing for their career success by holding their laptops without using them. The advertiser promoted the computers by claiming they were matched to the needs of the users. The advertisement with the male character depicted one young, well-dressed, and confident man. He is pictured sitting up high, overlooking a beautiful body of water while working on his laptop. He was clearly on top of the world and working independently. One could conclude that the laptop had freed him from his office space. When females were depicted in the print-based technology advertisements, they were often draped in sexy poses on computing equipment (Knupfer 1997). Even teachers who are interested in technology are bombarded with gender bias in magazines.

Televison commercials also use biases when they depict genders. One example is the United Parcel Service segments that advertise a new on-line package tracking system. In the commercial the women are doing some clerical task that is unrelated to tracking the package. Yet, the male character takes center stage and manipulates the computer to track the package while the female serves to attract attention. Another commercial for cellular telephones shows a female real estate agent receiving a
call in the middle of showing a home. She is relieved that the school nurse was able to locate her in order to request that she come to school to pick up her sick daughter. A similar commercial featured a male who was able to perform his job more proficiently because he could receive a business telephone call while out of the office with another client. These ads promote cell phones for women so they can stay in touch with their children, while they promote them for men to help them conduct business away from the office.

Another type of advertisement where biases are found is banners. Banner advertising includes any advertisements that flow across the top and sometimes the bottom of a web page. Knupfer (1996) analyzed these banners and found that those advertisements follow similar stereotypes as the print and television media. An AT&T banner advertisement was drawn using Yahoo as a search engine under the topic K-12 and college preparatory schools. The advertisement depicted a young adult female who said “my provider left town on me.” The other female character said, “I know how you feel.” The women seemed to be helpless discussing feelings of abandonment, but not of finding a solution. The AT&T banner advertisement that featured male characters was different. One young adult male said “My
Internet access bill ranges anywhere from $10 to $200.”

The mature man, appearing to be a mentor or fatherly image replied, “You need stability, Pat.” The conversation of the men in the advertisement was focused on a theme of authority and control. The conversation of the women was focused on feeling and insecurity.

There is also the problem of ads that depict women in a variety of provocative poses. Some of these ads can be seen within the K-12 education-children category. One ad showed a curvaceous woman lying in the water in a skimpy bathing suit, with the text reading “Dangerous curves ahead.” This ad appeared at both the top and the bottom of the screen, so the reader could not miss it. This ad was found where teachers, parents, and even children would look for information.

Internet

Yet another reason why girls show less interest in the use of computers than boys is the Internet. As soon as females log onto the Internet they are bombarded with references to sex (Kantrowitz & Rosenberg, 1994). It is like going to work and finding pornographic posters adorning the walls. For example, Janis Cortese wanted to become part of the Trekkie discussion group on the
Internet. The fans on line devoted their talk to find out which one of the Star Trek characters had the biggest breasts. When Janis made some comments about the male characters on Star Trek she was quickly chased off the net. Thé Trekkies had flooded her e-mail account with nasty messages, a practice known as flaming. Women want to get on the Internet but they have to do it cautiously in order to avoid harassment. More and more women are signing on to networks that are either coed or run by women or are exclusively for women. Stacy Hern started ECHO (East Coast Hang Out) because of hostility on line. About 60% of ECHO’s 2000 subscribers are men. Yet, among ECHO’s 50 forums only 2 are strictly for women. The official policy of ECHO is that there are no such things as a dumb question and no flaming. Gender bias exists on the Internet and therefore it forces the formation of networks like ECHO.

There is also gender bias in the computer industry since males outnumber females 3 to 1 in technology jobs (Kirkpatrick & Cuban, 1998). Women who work in programming are very few and some of the most successful have been developers of software for children (Kantrowitz & Rosenberg 1994). Even though women are few in this industry they make excellent role models for school age
girls and are greatly valued. One example is Jan Davidson, a former teacher, who started Davidson & Associates. She started with three programs and is now the country’s biggest developer of kid’s software with 350 employees and $58.6 million in revenues. At Mary Cron’s Rymel Design Group, most of the software designers are women. This is far from the stereotype of the solitary male programmer laboring long hours into the night with only takeout pizza food for company.

Possible Solutions

Given the problem of gender inequality that has been studied above, we should then consider how to address and rectify it. A study done by Flom, Hansen, and Walker, (1998) identified principles that when woven into teaching practices and school activities strengthen girls’ confidence and their ability to achieve in computers. Throughout their education girls should be provided with equal access to learning through hands-on experience with computers and lab equipment that are often dominated by boys. Their education should involve cooperative learning groups that eliminate competitive classrooms. Girls in high school should be provided with mentors and role models to help reduce the risk of dropping out of
technology courses. They should also work with community groups and businesses to provide them with positive directions towards success.

One example of a great gender equity program has been implemented in the rural Appalachia School System. This is a high school model that focuses on equity issues, student motivation, and non-traditional course work. The program also addresses career awareness for females with a strong emphasis on technology and science. The objectives of the program are the following:

1. To establish higher expectations of female students in both academic and vocational classes.
2. To implement career exposure activities that provides female student information on non-traditional careers.
3. To provide female students with a curriculum which integrates academic and work experiences.
4. To provide female students with career and social guidance and counseling.
5. To evaluate female student’s progression through motivational and attitudinal assessments.
6. To include multiple resources in creating a gender equity program.
This gender equity model is funded by a federal grant. The model is made up of three different stages. The first stage requires interest surveys and assessments. A pre-test on school interests and motivators is also given to the students. An advisory committee is also formed for each student. Career assessments are done on a computer program, where the students learn more about their career interests and what course work they need for a particular career. The program also gives them information on universities offering such degrees, salaries, and scholarship money. The information then becomes the student’s criteria when they consider careers.

The second stage involves activities in problem-solving and decision-making process, goal setting, team building, and communication process. All activities are done in groups because the level of energy focused on a goal attainment is higher as a group. Higher levels of trust are also reached when group interaction occurs. The third stage requires hands-on job experience and placements requiring a minimum of fifty hours work with local employers in the interested, non-traditional fields of study for females. The majority of these placements promote knowledge and application of various technology skills. Another component of this equity model utilizes
various community resources mostly local business and
employers. School staff and students receive professional
development in topics such as gender and technology
issues, integrated teaching, motivation through the use of
computers, and how to use new software. There is more
public awareness through this partnership and the students
working in the community. After its first year of
implementation, this program’s results were superior.
Findings from the qualitative data (student presentations
and interviews) reflect a high success rate on career
awareness and self-confidence in attainment of set goals.
Quantitative data reflected gains in various areas as
well. The ninth grade class reflected the greatest gains
in overall school attitude. This included students’
motivation for working hard in school, desire to perform
competently in school, and the student’s perception of the
importance of school and how it relates to future plans.
The tenth graders improved in both academic self-concept,
performance and reference based abilities. In the twelfth
grade, greater gains were shown in a combination of
academic self-concept performance and sense of control
over performance. The sense of control measures the amount
of control a student feels she has over school outcome.
Overall, across all grades, 61% of the female participants
demonstrated an improvement between the original pretest and posttest scores (Beasley, Wark, & Zimmerman, 1998).

The literature review demonstrates that gender inequality exists and is exacerbated in the use and encouragement of computer use. Society is constantly treating girls differently than boys. Whether in school or among their own peers, girls are constantly hearing the message that computers are mainly for boys. Even when girls use computers, they are reminded by advertisements and the media that the computer world is mainly for males. Because the future jobs are going to be in computer science and related technology, it is of great importance that females get their fair share of these jobs and that they develop the skills they need to do so. Living in the United States of America guarantees equal opportunity for all. The time is long overdue for new educational programs that promote success for girls in computer education. There are currently few programs in place today that guide girls to be successful in the computer world. These programs need to be implemented in all of our public schools. Until these programs are in place, we will not be able to address the continued gender inequity.
CHAPTER THREE
DESIGN AND DEVELOPMENT

Subjects

One of the goals of this project was to present gender equity information in a non-threatening manner which could also be easily retrieved. Since some of the teachers at Henry Elementary are apprehensive about using computers, the design of the computer page would have to be simplistic and easy to use. Therefore, the author of this project followed the design guidelines for web pages by Ann E. Barron, Associate Professor at the University of South Florida, Brendon Tankins, Internet Specialist, and David Tai, Webmaster for the Florida Center for Instructional Technology (2001). Based on the general guidelines of web page development, the first step was to analyze the content and the audience. The audience is all the teachers and administrators at Henry Elementary. The content is gender equality and is an issue that teachers encounter within their classrooms everyday. Having analyzed the content and the audience, the author decided that the web page would be an "Informational Page." The page was given the descriptive title of "Gender Equity and Computer Use." There are twelve buttons on the front page
(see Appendix B) with the following descriptive titles: Equity Model, Awareness/Strategies, Web Sites for Teachers, Gender Test, Lesson Plans, Computer Schedule, Ideas for Parents, Classroom Strategies, Web Sites for Girls, Research, and National Standards.

Equity Model

Under the Equity Model page (see Appendix C) the example model comes from North Carolina's rural Appalachia School System (Beasley, Wark, & Zimmerman, 1992). This model focuses on equity issues, student motivation, and nontraditional course work. It also addresses career awareness for females with a strong emphasis on technology and the sciences.

Gender Awareness

The Gender Awareness page (see Appendix D) has a list of ideas teachers can use in the classroom to obtain a gender balance (Anderson, Brooks, & Reavis, 2001). Some of the ideas are: calling on girls as often as boys, having high expectations for both boys and girls, making eye contact with all students and calling them by their name.

Web Sites for Teachers

The Web Sites for Teachers page (see Appendix E) has a list of twenty-eight different sites that can give
teachers more information about gender equity. One example is www.equitynj.org a resource that will help teachers to make school equitable for all children.

Gender Test

The Gender Test page (see Appendix A) is self-analysis to find out if teachers have a tendency to be gender bias in the classroom. The author of this project created the Gender Test. Some of the sample questions include: 1. Do you compliment boys in your classroom more than girls? 2. Do you spend more time explaining things to boys than girls? 3. Do you do the work for girls instead of explaining the problem? 4. Do you expect the boys to know all the right answers? After answering these questions the teachers will begin to examine their teaching strategies and then follow the website for more information.

Lesson Plans

The Lesson Plans page (see Appendix F) gives teachers five step-by-step lessons that they can use in their classroom. One of the lessons is Career Research (see Appendix G). The objective of the lesson is for students to research a career that is usually held by the opposite gender. For example, a girl would research the career of
"Firefighter" and a boy would research the career of "Nurse." Doing this lesson will give students better gender awareness and break down some career gender stereotypes. The author of this project created all the lesson plans for this project.

Computer Schedule

The Computer Schedule page (see Appendix H) features four different sample schedules to choose from, depending on how many computers and students a teacher has in the classroom. For example, one schedule is for a teacher that has thirty-four students and four computers. When teachers have a set computer schedule it guarantees that all boys and girls will have access to technology and thus maintaining gender equity and computer accessibility.

Ideas for Parents

The Ideas For Parents page (see Appendix I) is a list of ideas that parents can use to break down gender inequality barriers (MacAlpine, Rector, Jones, & Neuberg, 2001). Some of the ideas are to encourage your daughter to be a problem solver, to take your daughter to work, and to expose your daughter to a wide range of experiences.
Classroom Strategies

The classroom strategies page (see Appendix J) is a list of strategies teachers can use in the classroom to acquire a good gender balance (Anderson, Brooks, & Reavis, 2001). Some of the strategies are providing female role models, incorporating boys and girls' comments into lectures, and to encourage girls to participate in math and science activities.

National Technology Standards

The National Technology Standards for elementary schools (see Appendix K) are divided into six categories. The first is basic operations and concepts. The second is Social, ethical and human issues. The third is technology productivity tools. Technology communications tools, is the fourth category. The fifth is technology research tools. The last category is technology problem-solving and decision-making tools (International Society for Technology in Education [ISTE], 2001). These standards provide a guideline of what boys and girls should know and what technology-based activities teachers should be providing to students.
Other Links

There are also six other links that are included in the web page. The first link is Teacher Strategies (see Appendix M). This page gives teachers strategies that encourage girls to use technology. The following four links are lesson plans that were designed to make classrooms gender equitable: Famous Person Research (see Appendix N), E-mail Pals (see Appendix O), Gender Art (see Appendix P), and Visit Web Sites (see Appendix Q). The last link included in the web page is Gender Equity Web Sites for Girls (see Appendix R). This page contains a list of web sites that offer girls gender equity information and support.

Development

Having analyzed the audience and content of the informational page, the next step in the design guideline was graphics. It was decided that one picture of a boy and a girl using computers would be used to convey the message of gender equity in computer use. The picture is completely relevant to the study and is small enough to prevent user impatience when waiting for the picture to be displayed. To add a little color to the page, square
colored buttons were used. These color buttons make the page attractive, but it does not overwhelm the eyes.

The next guideline was text. Here it was advised to use high contrast between the text and backgrounds. The color text for this project is black for titles and dark blue for subtitles. The background is a very light yellow which makes it easy to read all the text. All the pages follow the format and are color coordinated to match the front page. In order to prevent distractions for the reader, there is no blinking text anywhere in the page. It was suggested under the guidelines for links, to use words other than "click here" as a link in the documents. All the links in this project are descriptive words so that the navigator knows exactly where he or she is going.

It is also advised in the guidelines that the links should be checked regularly. Because all the pages are going to be held within a zip disk for this page, there is a very small chance of any connections being lost or changed. There is also a link from every page to the home page. Every page has a home button at the top and bottom of the page to make it easy to find one’s way back to the home page. There are also no dead end pages to prevent any navigators from getting lost. The guidelines for page size recommend that the home page should only be one screen
length, which does not require any scrolling by the user. For this project the home page, title, picture, and menu can all be seen within one screen. All the information that the reader needs is in one screen.

Formative Evaluation

The formative evaluation was administered at Henry Elementary. Participating was a 2nd grade female teacher, two 3rd grade male teachers, a 5th grade male teacher, a female Reading Specialist that works with K-5 students, a female Resource Specialist that works with students from 1st to 5th grade and the female Principal of Henry Elementary. The participants were not given time limitations and they could ask the project developer any questions at any given time. Five of the participants did the evaluation on their own and two participants worked as a team. All of the participants completed the evaluation in the project developer’s classroom at Henry Elementary. The time used to evaluate the web page by the participants ranged from twenty-five minutes to one hour and twenty minutes. Before beginning the evaluation some participants were given instructions on how to use the web page while other participants did not need any instructions. All of the participants were observed during the time they were
evaluating the web page. During the observations the project developer noticed that only one out of seven participants needed help in finding the way back to the home page.

When the participants were done viewing the informative page they were given a two-page evaluation sheet to fill out (see Appendix L). The evaluation sheet was broken down into two parts. The first part was content and the second part was program functions. There was also space for suggestions on improving the web page. Under the content heading the following questions were asked: Was the information presented accurately? Was the content presented effectively? Was the information presented efficiently? Does the content avoid offensive representations? Is the information useful for teachers? Then there was a space for comments about the content of the project. The program functions part of the evaluation had the following questions: Was the web page easy to navigate? Did you have to wait long for the information to appear? Were there any distracting elements on the page? Were there any errors with links? Was there continuity in page design throughout the project? Then there was a space to make comments about the program functions.
All participants answered yes to all the content questions. Positive comments were made to the following question: Is the information useful for teachers? All the participants thought the information was very useful. Some of the comments for the content part of the evaluation were the following:

1. It makes you think about things that are taken for granted and it allows for reflection on your teaching style.

2. The sample lessons are very helpful.

3. The project makes you analyze your teaching style and to be aware of things you do unconsciously with regards to gender. It is going to have a big impact on the way I teach children.

4. The project is very informative. The literature provided allows you to read about different expectations and stereotypes about gender and what you can do as an educator to have gender equity in your class.

5. This project is a perfect tool to raise teachers' awareness and evaluate their practice in gender equity. The author should share this
resource with our staff at a staff meeting to be arranged.

6. Before using this web page, I was unaware of gender equity issues regarding girls and technology.

Under program functions all participants agreed that the web page was easy to navigate and that they did not have to wait long for the information to appear. None of the participants found any distracting elements in the page. There was a consensus among all participants and the design throughout the project. They all believed that the design was continual in all pages. There were no pages that appeared to be out of synchronization. The participants encountered few errors with links. Some of the links did not stay constant from the computer where they were created to the new computer where the participants viewed the web page. The participants were able to view all pages, even though a few links did not connect. Some of the comments made about the program functions were the following:

1. The web page is extremely easy to use and well organized.

2. The program was very user friendly and easy to navigate.
All the participants would recommend this web page to other teachers. Some of the suggestions given by the participants in order to make the web page better were the following:

1. The gender signs needed to be included in the
2. Examples of cooperative and competitive activities needed to be included.
3. Include more pictures/icons so it is not only text.
4. Include that the focus of gender equity ideas for parents was directed to girls.
5. Fix the few links that did not connect in the computer at school.

After the evaluation test was completed, these suggestions were also added to the web page. The revised informational web page was introduced to the Henry Elementary Staff and is available for use at the school library.
CHAPTER FOUR

SUMMARY

The main idea of the project was to find out if there was gender equity in computer use. Through literature review, it was found that there was and continues to be gender inequality in computer use. There were many factors that lead to this inequity in gender and some were society, household expectations, classroom expectations, media and advertisement, and the Internet. A project was then designed to address this gender inequality. The targeted audience was teachers. More specifically the project would be directed to the teachers at Henry Elementary. The reason for choosing teachers as a target was an obvious one. Teachers have a tremendous influence in what children learn. Therefore, if teachers are teaching lessons with gender equity in mind then the students will learn gender equity as a way of life. All the information was put forth to teachers by means of an informational web page. One of the goals of the web page was to inform the teachers at Henry Elementary that there is gender inequity in computer use. The second goal was for the teachers of Henry Elementary to become more gender balanced in their teaching. The final goal was to make the
gender equity information easily accessible to the teachers of Henry Elementary.

The following have been included in the informational page: an equity model for schools, technology grade level standards, a sample computer schedule, ideas for parents, a gender test and lists of web sites to contact. The web page was put through a formative evaluation and changes were made according to the suggestions and feedback of the evaluation participants. As soon as the web page is set in its intended location at the central library at Henry Elementary, all teachers will have access to it. The equilibrium should slowly start shifting to balance gender equity in computer use. As this change takes place, the girls will get their fair share of computer use that can eventually lead to technology jobs that are now mainly for males. It is time to be informed about the gender equity problem and make changes in education in order to truly have equal opportunity for all in the United States of America.

Limitations

There were two different limitations in this project. The first limitation was that the web page was done all inclusive of a zip disk and not put on the Internet. The
content of this project would have been beneficial to all teachers who have access to the Internet but since the web page is held in a zip disk it will only be of use to the teachers and administrators of Henry Elementary. The author of this project felt he did not have enough technical knowledge to put this project on the Internet.

The second limitation of this project was not interviewing the web page evaluators after they were done viewing the web page. The participants were given a two-page evaluation and very useful information was collected. To have a better understanding of what the participants thought about the web page an interview of each participant should have taken place.

Recommendations

One possible solution to gender inequality in computer use is to put a gender equity program in place at public schools. Such a program would have to be woven into teaching practices and school activities to strengthen girls’ confidence and their ability to achieve in computers. A girl’s education should involve cooperative learning groups that eliminate competitive classrooms. Girls should also be provided with equal access to learning through hands-on experiences with computers and
lab equipment and be provided role models throughout their education to reduce the risk of dropping out of technology courses. Working in their community will also provide them with a positive direction towards success. These solutions were found in a study done by Flom, Hansen, and Walker, (1998).

Conclusion

The literature review shows that gender inequality in computer use exists today. The inequality begins at birth with society giving boys and girls' roles that they have to play. As kids grow up they play the same social roles that their parents interpret as appropriate for their gender. Many times these roles are favorable for boys and not girls. The gender roles are defined even further in schools. In school, boys and girls encounter peer pressure to act a certain way according to their gender. Some teachers have a gender bias that they use unconsciously against girls. As if that is not enough, the media and advertisement also have a gender bias against girls. With all these inequalities towards girls, there is an enormous need for programs in education that will be sensitive towards girl's needs. Having such programs will raise a girl's chance of success in technology use. These programs
need to establish higher expectations of female students in technology. The time is long overdue for these types of programs. Once these programs are in place we can truly say that in the United States there is equal opportunity for all.
APPENDIX A

GENDER BIAS TEST
Gender Bias Test

Answer the following questions to yourself

1. Do you compliment boys in your classroom more than girls?
2. Do you spend more time explaining things to boys than girls?
3. Do you do the work for girls instead of explaining the problem?
4. Do you expect the boys to know all the right answers?
5. Do you stop talking to girls when a boy asks you a question?
6. Do you have higher expectations for boys?
7. Do you allow groups of boys to compete against groups of girls?
8. Do you only have posters of male role models on your classroom walls?
9. Do you call on boys more than girls?
10. Do you make eye contact with all your students everyday?

Some of these questions may take some monitoring of your actions in the classroom before you can answer them. If you answered yes to any of the above questions or you want more information about gender equity in the classroom, take some time to explore the rest of this informative project.
Gender Equity and Computer Use

This project was put together for the teaching staff at Henry Elementary.
APPENDIX C

EQUITY MODEL
Equity Model

This model comes from North Carolina’s rural Appalachia School System.

This model focuses on equity issues, student motivation, and nontraditional coursework. It also addresses career awareness for females with a strong emphasis on technology and the sciences.

This high school model for gender equity has six specific objectives:

1. To establish higher expectations of female students in both academic and vocational classes;
2. To implement career exposure activities that provide female students information on nontraditional careers;
3. To provide female students with a curriculum which integrates academic and work experiences;
4. To provide female students with career and social guidance and counseling;
5. To evaluate female students’ progression through motivational and attitudinal assessments; and
6. To include multiple resources in creating a gender equity program

(Beasley, Wark, & Zimmerman, 1992. p. 2)
APPENDIX D

AWARENESS
Awareness

- Call on girls as often as you do boys, and be sure to ask the girls some of the higher level cognitive questions (research shows that both male and female teachers initiate more interaction with boys, and on higher cognitive levels).

- Have high expectations of both boys and girls; don’t over-nurture the girls (over-nurturing encourages dependence rather independence).

- Give girls an equal amount of help and feedback (boys usually receive more help and praise which builds self-esteem).

- Encourage girls to use manipulatives and to participate in hands-on experiences (without encouragement girls tend to be passive learners).

- Balance cooperative and competitive activities (most girls learn more readily in cooperative situations).

- Use gender-free language in classroom discourse (avoid the use of male terms for generic concepts, e.g. use synthetic instead of man-made).

- Give substantive feedback to girls’ as well as boys’ answers - not just a nod or an “okay.”

- Make eye contact with all students and call them by name.

- Don’t interrupt girls or let other students do so.

- Don’t stop talking to a girl when a boy approaches.

Classroom Attitudes

- Encourage a “can do” attitude; teach students to give themselves credit. (Girls tend to credit their achievements to luck rather than to their ability.)
• encourage all students to take additional math and science courses (teacher encouragement has been shown to be a major factor in students’ decision-making processes).

• encourage girls to take risks.

• judge what girls say, not how they say it (don’t assume that if they hesitate or apologize, they don’t know the answer).

• help girl students value themselves (girls often have a severe drop in self esteem during the middle school years. Women teachers need to model a healthy self respect and male teachers need to have respect for both girl students and female colleagues).
APPENDIX E

WEB SITES FOR TEACHERS
Web Sites for Teachers

American Association of University Women - An international organization that promotes education and equity for all women and girls. Includes information about all the resources AAUW has to offer, as well as information about relevant issues. www.aauw.org

"Campbell-Kibler Associates, Inc." - A resource page where you can download .pdf brochures focused on increasing gender and race equity in coeducational math, science, and technology classes. www.campbell-kibler.com

Center for Research on Women - Includes reports on many of the center's projects and programs, as well as an extensive list of their publications which can be ordered online. www.wellesley.edu/WCW/crwsub.html

ColorMathPink.com - a new Internet site designed to help girls excel at math. CMP offers academic assessment, tutoring, and information for third through twelfth grade girls. All of the services offered by CMP are free. www.ColorMathPink.com

Eduhound - An education search engine for everything from lesson plans to articles and journals to student resources and much more; for grades K-12. www.eduhound.com/

Eisenhower Regional Consortium for Mathematics & Science Educational at AEL - Click on math & science consortium where you will find great teacher resources, including links to sites with lesson plans, and many other resources. www.ael.org

Equity and Access in Mathematics Forum - comprehensive list of sites related to equity in math and science. Forum.swarthmore.edu/social/math.equity.html

Equity New Jersey - Offers information on gender and career equity programs as well as sexual harassment, diversity issues, single parenting, school to work, nontraditional and vocational education. www.equitynj.org

Fair Test - The National Center for Fair and Open Testing - an organization that works towards an end to the inequities in standardized testing. Includes reports on related projects, publications, fact sheets, etc. www.fairtest.org
Femina - A search engine for sites by, for, and about women.
femina.cybergrrl.com

Flirting or Hurting? A Teacher’s Guide - The site of the three part video companion to Nan Stein’s curriculum, “Flirting or Hurting?: Sexual Harassment in Schools.”
www.wgby.org/tms/flirt/fhmain.html

Girls Incorporated - Information about girls Inc.'s programs, membership, research, advocacy, and the new Girls’ Rights Campaign. Information is aimed at adults. Also includes a link to a Girl’s Inc site for girls, which has programs on archeology, the internet, the media, and more.
www.girlsinc.org

Girls Scouts of the USA - This extensive site includes many articles, as well as sites within the site for girls.
www.girlsinc.org

Journal of Vocational and Technical Education - An archive of the journal, as well as a search engine of all e-journals.
scholar.lib.vt.edu/ejournals/JVTE/

Making Schools Work for Every Child - A resource for educators interested in making schools equitable for all students. Math and science equity materials are included.
equity.enc.org/

Midwest Equity Assistance Center - This center, funded by the U.S. Department of Education, provides assistance in the areas of race, gender, and national origin equity to public school districts.
meac.educ.ksu.edu/

Ms. Foundation - Includes information about Ms. grants and programs, women’s history month, bring your daughter to work day, as well as bios of the top ten women of the year.
www.ms.foundation.org

National Center for Research in Vocational Education - The center’s mission is to strengthen education to prepare all individuals for lasting and rewarding employment and lifelong learning. This site offers reports, projects, and links that seek to further their mission.
vocserve.berkeley.edu/

The National Coalition For Sex Equity In Education - This coalition works to provide leadership in equity education on issues including, but not limited to gender, race, disability, national origin, religion, and sexual orientation.
www.ncsee.org
The National Institute for Women in Trades, Technology & Science - IWITTS is dedicated to integrating women into non-traditional careers by providing training, technical assistance and publications to the education system and employers.
www.iwitts.com

New York State Occupational Education Equity Center - The center works with educators in New York State to provide equal access to education, careers, and life options for all students.
www.nysed.gov/workforce/equity.html

SmartGirl - Devoted to promoting media either designed for or made by girls and women.
www.smartgirl.com/

U.S. Department of Education Office of Civil Rights - Includes civil rights documents and publications, and offers information for those interested in filing a civil rights complaint.
www.ed.gov/offices/OCR

Women in Technology International (WITI) - The WITI foundation is dedicated to advancing women in technology, helping women be more financially independent and technologically literate, and encouraging young women to choose careers in science and technology.
http://www.witi.org/

Women in Technology International / Advocates for Women in Science, Engineering, and Mathematics - A nationwide advocacy program linking middle and high school girls with science and technology professionals from a broad range of fields.
awsem.org/witi

Women in Engineering - National Academy of Engineering site. Click on “Celebrating Women in Engineering.”
www.nae.edu/

Women’s Educational Equity Act - This online resource center of WEEA includes publications, referrals, WEEA history, a gender equity expert panel, and an electronic discussion about equity in education.
www.edc.org/womensequity

Women’s History on the Web - An electronic encyclopedia and a network of women’s history sites.
http://women.eb.com
APPENDIX F

LESSON PLANS
Lesson Plans

1. Famous Person Research
2. E-mail Pals
3. Career Research
4. Gender Art
5. Visit web sites

Example of cooperative activities: Working with a partner or group in the Career Research Lesson. One group member can gather information from one web page and another group member can gather information from a different web page. A third member can write the report and a fourth member can present it to the class.

Example of competitive activities: After completing the Gender Art Lesson the teacher will exhibit the art and invite judges to choose the best 5 art pieces. The winning art pieces will be published in the classroom newsletter.
APPENDIX G

CAREER RESEARCH
Career Research

Grade: 4th-6th

Subject: Gender Awareness, Technology, Language Arts, Oral Language development

Objectives: 1. Students will research a career that is usually held by the opposite gender. For example; a girl will research the career of “Firefighter” and a boy will research the career of “Secretary.” 2. Students will gather information about careers using the internet. 3. Student will put together a report on a career. 4. Students will present the report to class.

Materials: Computers, internet access, pencil, paper,

Procedures: 1. The teacher and students will brainstorm careers that are mostly held by one gender and write them on the board. 2. Students will choose one of the careers that is usually held by the opposite gender. 3. The students will look for information about that career on the internet. 4. The students will put together a report. 5. The students will present the report to the class.

www.coolcareers forgirls.com
APPENDIX H

COMPUTER SCHEDULE
Computer Schedule

Your computer schedule will be dependent upon the ratio of students to computers in your classroom. Obviously, the more computers you have, the more flexibility you will have.

In order for all students to have access to computers each day you need to assign time slots throughout the day. Having a set schedule guarantees that all boys and girls have access to technology. Thus, keeping gender equity in the classroom.

Students should be scheduled during instruction of subject matter in which they do well. It is important to rotate the schedule on a regular basis so that students will avoid experiencing the same conflicts throughout the year.

Sample schedules (Schedules have to be adjusted according to your daily time schedule)

34 students and 4 computers
20 students and 4 computers
34 students and 2 computers
20 students and 2 computers
34 students and 4 computers

<table>
<thead>
<tr>
<th>Time</th>
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recess 9:35-9:50

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<td>11:55-12:15</td>
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lunch 12:30-1:15

Once all students have had their computer time the rest of the school day can be used as Open Computer Time where the students can do further work on a technology lesson.
20 students 4 computers

<table>
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<tr>
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Recess from 9:15-9:30

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Recess from 10:45-11:00

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Once all students have had their computer time the rest of the school day can be used as Open Computer Time where the students can do further work on a technology lesson.
34 students 2 computers

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lunch from 12:30-1:15

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dismissal at 2:35
20 students 2 computers

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APPENDIX I

IDEAS FOR PARENTS
Ideas for Parents

- Inspire your daughter with stories featuring gutsy little girls.
- Offer to help your daughter’s teacher at school.
- Check homework and be positive.
- Play games that involve math with your daughter.
- Expose your daughter to a range of experiences.
- Take your daughter to work.
- Encourage independence and responsibility.
- Talk about science and math.
- Offer guidance but encourage your daughter to fight some battles.
- Encourage your daughter to be a problem solver.
- Be truthful about sexual stereotypes.
- Hold high expectations for your daughter.
- Discuss your daughter’s personal and career goals.
- Let your daughter choose.
APPENDIX J

CLASSROOM STRATEGIES
Classroom Strategies

- Mentally divide your room into quadrants. If students in all quadrants don’t participate, you can say, Let’s hear from someone in the back right corner.

- Ask students to state concepts out loud (this helps students to learn the vocabulary of the subject).

- Cultivate bonding around an intellectual challenge (this provides students with an opportunity to feel like a team).

- Use the human body as a vehicle for interesting girls in physics, etc. (girls often find the human body fascinating and will identify with phenomena related to the body).

- Encourage girls to participate in extracurricular math and science activities.

- Stress safety precautions instead of dangers (girls will sometimes be reluctant to participate in lab activities if they seem too dangerous).

- Use computer and lab partners (most girls work better in teams).

- Introduce lessons with an overview (girls learn more readily from the “big picture” rather than from disconnected details).

- Incorporate students’ comments into lectures (this technique validates the students’ understanding of concepts).

- Acknowledge the contributions of both men and women to mathematics and science via posters, reports, examples, story problems, etc.

- Use cooperative activities and some single-sex small groups.

- Provide female role models.

- Provide opportunities for girls to develop spatial visualization skills.
• use writing to help students express and clarify their feelings and thoughts (e.g., math autobiographies, science journals).

• create an attractive classroom environment (research shows that girls learn better in an aesthetically pleasing environment).

• wait 4 or 5 seconds before calling on a student to answer the question (girls often wait until they have formulated an answer before they raise their hands; boys often raise their hands immediately and then formulate an answer).

• don’t grade on a curve (encourage all students to realize their potential rather than to compete against one another).

• solve problems by multiple methods (this appeals to students with different learning styles).
APPENDIX K

NATIONAL TECHNOLOGY STANDARDS
National Standards

The technology foundation standards for students are divided into six broad categories. Standards within each category are to be introduced, reinforced, and mastered by students. These categories provide a framework for linking performance indicators within the Profiles for Technology Literate Students to the standards. Teachers can use these standards and profiles as guidelines for planning technology-based activities in which students achieve success in learning, communication, and life skills.

Technology Foundation Standards for Students

1. Basic operations and concepts
   - Students demonstrate a sound understanding of the nature and operation of technology systems.
   - Students are proficient in the use of technology.

2. Social, ethical, and human issues
   - Students understand the ethical, cultural, and societal issues related to technology.
   - Students practice responsible use of technology systems, information, and software.
   - Students develop positive attitudes toward technology uses that support lifelong learning, collaboration, personal pursuits, and productivity.

3. Technology productivity tools
   - Students use technology tools to enhance learning, increase productivity, and promote creativity.
   - Students use productivity tools to collaborate in constructing technology-enhanced models, prepare publications, and produce other creative works.

4. Technology communications tools
   - Students use telecommunications to collaborate, publish, and interact with peers, experts, and other audiences.
   - Students use a variety of media and formats to communicate information and ideas effectively to multiple audiences.
5. Technology research tools
   - Students use technology to locate, evaluate, and collect information from a variety of sources.
   - Students use technology tools to process data and report results.
   - Students evaluate and select new information resources and technological innovations based on the appropriateness for specific tasks.

6. Technology problem-solving and decision-making tools
   - Students use technology resources for solving problems and making informed decisions.
   - Students employ technology in the development of strategies for solving problems in the real world.

http://cnets.iste.org
APPENDIX L

EVALUATION SHEETS
Gender and Computer Use
Web Page Evaluation

**General information:**
Reviewer’s position ____________________________
Work location ____________________________
Grade level ____________________________

**Content:**
Was the information presented accurately? ____________________________
Was the content presented effectively? ____________________________
Was the information presented efficiently? ____________________________
Does the content avoid offensive representations? ____________________________
Is the information useful for teachers? ____________________________

Please make any comments about the content of this project. ____________________________

**Program functions:**
Was the web page easy to navigate? ____________________________
Did you have to wait long for information to appear? ____________________________
Where there any distracting elements in the page? ____________________________
Where there any errors with links? ____________________________
Was there continuity in page design throughout the project? ____________________________
Please make any comments about the program functions of this project.

[Blank lines]

Do you have any suggestions that can make the web page better?

[Blank lines]

Would you recommend this web page to other teachers?

[Blank lines]

Thank you very much for your comments and suggestions, they will be very helpful in completing chapter 3 of my thesis.

Raymond Rubalcava
APPENDIX M

TEACHER STRATEGIES
Teacher Strategies

- **Emphasise values** – the benefit of this approach is that it will attract more girls because technology is no longer seen as largely concerned with technical solutions to technical problems. Technology is used to emphasize the relevance of people and their quality of life. In this sense it changes the emphasis from objects to people and from the impersonal to the personal.

- **Offer optional areas of study** – flexibility needs to be built into the curriculum to ensure that boys and girls pursue activities that are of particular interest for themselves.

- **Demonstrate the fantastic and spectacular** – girls and boys alike are interested in the fantastic and spectacular aspects of technology and the real way in which technology is concerned with the quality of life. This natural interest should be stimulated.

- **Relate projects to the real world** – we must engage girls in design activities beyond the school and connect them to the real world.

- **Avoid abstraction** – the abstract quality of problems boys and girls try to solve in school do very little to attract interest or contribute to a concern for the quality of human life. These problems can be made more relevant or more attractive to both boys and girls by placing them in context.

- **Avoid diffusion of the subject** – when devising work that appeals to girls it is important not to give a false or diluted impression of what the subject is about.

- **Seek feedback from students** – it is important that not only the students but also the teachers of technology evaluate their work.
APPENDIX N

FAMOUS PERSON RESEARCH
Famous Person Research

Grade: 3rd-5th  Subject: Technology, Language Arts, Gender Awareness

Objectives:
1. Students will research a famous person of the opposite gender.
2. Students will write a report.
3. Students will present report orally.
4. Students will use the internet to gather information about the famous person.

Materials:
Internet access, pencil, paper, Alpha Smarts (to publish report).

Procedures:
1. The students will brainstorm a list of famous people that they want to learn more about.
2. The students will choose a name of a famous person from the list to learn about but it has to be from the opposite gender as the student.
3. The students will gather information about the person's life (accomplishments, education, birthplace, birthplace, etc)
4. Students will write a report and present it to the class.
APPENDIX O

E-MAIL PALS
E-mail Pals

Grade: 3rd-6th

Subject: Gender awareness, technology, Language Arts

Objectives: 1. Students will become acquainted with a student of the opposite gender. 2. Students will learn how to send e-mails properly. 3. Students will report similarities between e-pals.

Materials: Computers, Internet access, E-mail account

Procedures: 1. Teacher needs to contact another teacher that wants to do the same lesson. This can be done by posting a message in one of many teacher bulletin boards on the web. 2. Both teachers need to pair up students and decide who is going to send the first e-mail. 3. The teachers need to show the class how to send an e-mail. With the computer connected to the TV monitor you show the student how to get into an e-mail page. Show the students where the e-mail address goes. Show the students where the “Subject” of an e-mail is. The name of the student can go on the subject line if everybody is using the same e-mail account. 4. The students start writing their e-mails.
APPENDIX P

GENDER ART
Gender Art

Grade: 3rd-6th Subject: Gender Awareness, Technology, Art

Objectives: 1. The students will identify signs that are used for gender. 2. The students will learn to use a paint program on the computer. 3. The students will create their own or use an existing gender sign and paint it.

Materials: Computers, TV monitor, Paint program, Drawings of gender signs,

Procedures: 1. The teacher will show the students drawings of different signs used in daily life such as stop sign, no smoking sign. The teacher will inform the students of the signs that are used to identify gender. (This could be done by a drawing or picture). 2. With the computer connected to the TV monitor the teacher will demonstrate the use of the paint program. The teacher will show students how to make geometric figures, how to color the shapes, and how to erase mistakes. The teacher will also show the students how to use the pencil in the paint program. 3. The students will then create their own gender sign or use the existing gender sign with the paint program.
APPENDIX Q

VISIT WEB SITES
Visit Web Sites

Objectives: 1. Students will visit web-sites that are predominantly geared to the opposite gender. 2. Students will become aware of different activities, and interests of the opposite gender. 3. Students will practice navigating the web.

Materials: Computer, Internet access,

Procedures: 1. The teacher will bookmark all the web pages that the students can use for this assignment. This will prevent students from accessing inappropriate web sites. 2. The teacher will show the students how to navigate the web using the computer hooked up to the TV monitor. 3. The students will navigate the designated pages according to their gender.

Web pages to be visited by girls:

www.boyscouts.com

Web pages to be visited by boys:

www.wnba.com
www.smartgirl.com
www.autodesk.com/compinfo/dyf
APPENDIX R

GENDER EQUITY WEB SITES FOR GIRLS
Gender Equity web Sites for girls

www.adiosbarbie.com

An Income of Her Own- for girls under age 20 to learn about starting their own business, saving money, etc.
www.anincomeofherown.com

*The Backyard Project- for high school girls exploring a career in computer science.*
www.backyard.org

Bio's of Women Mathematicians- good info about women in math.
www.agnesscott.edu/lriddle/women

ColorMathPink.com- a new Internet site designed to help girls excel at math. CMP offers academic assessment, tutoring, and information for third through twelfth grade girls. Find a tutor, get help with homework, take a diagnostic test to determine strengths and weaknesses, review problem solving strategies, reduce math anxiety, play math games, talk with other girls about math. www.ColorMathPink.com

Cool Careers for Girls series of books by Ceel Pasternak and Linda Thornburg.
www.coolcareersforgirls.com

Design Your Future: Math, Science, and Technology for Girls- This site offers young women practical, inspiring, hands on opportunities to explore careers in math, science, and technology.
www.autodesk.com/compinfo/dyf

For Girls With Opinions- A place for girls to talk about issues facing girls with opportunities for all girls to contribute writing.
www.smartgirl.com

*Gender Equity - Featuring women career role models in exciting jobs within Massachusetts. Can e-mail correspond with role models. Career descriptions, salaries and links to professional organizations.*
www.genderequity.org

Girls Domain -Career information for and written by girls.
www.myowndomain.com/girlsdomain/
*Girl Geeks- This site focuses on the internet and technology. It includes mentors and a career search engine.
www.girlgeeks.com

Girl Tech- This site has information on topics interesting to girls, including sports, technology, invention, and lots more. Also includes a chat room.
www.girltech.com

Girls On the Move- This is the site of a special Outward Bound program, in which, a group of women will be riding their bikes across the country to celebrate and promote physical, mental, and emotional health in girls ages 9-18.
www.obgotm.org

Girl’s Pipeline- This site includes Girls Speak Out, a place where girls can share their views on a variety of topics, as well as great resources and links to other sites.
www.girlspipeline.org

Girlsite Network- Colorful site with special flash features. The site includes information about journalism, volunteer and writing opportunities, etc. There are also opportunities for girls to get published on the site.
www.girlsite.org

Greaser Grrls- A great site for girls who love cars and trucks, filled with stories and pictures of other “greaser girls.”
www.greasergrrls.com

Great Women- A women’s history site, with bio’s and pictures of lots of well known, and little known women.
www.greatwomen.org

Gurl.Com- This website is jam packed with articles, art, poetry, advice, polls, contests, grants for girls, girls’ webpages, a chat room and much more.
www.gurl.com

HerInteractive.com - Nancy Drew mystery interactive games for girls, ages 10 on up.
www.herinteractive.com

*Mentornet Wires Female Engineers and Scientists- site of women mentors in science and engineering, can set you up with a mentoring relationship.
www.mentornet.net

National Organization of Women (NOW)- lots of info on current events and issues of concern to women. “Young Feminism” link included.
www.now.org
New Moon Magazine for Girls and Their Dreams- This is the website of New Moon, a magazine aimed at early adolescent girls. This by girls/for girls magazine challenges stereotypes by celebrating the strengths of all girls.
www.newmoon.org

Not So Wild a Dream- Encourages students of color to pursue careers in science.
www.hhmi.org/dream

*Role Models Project- A resource center which includes information about women in technology, articles written by women for women, role models, etc.
www.womenswork.org

Science is for Girls- fun science site specifically aimed at girls.
www.hopper.com/scigirl.html

Shewire- A fun site full of articles on women and girls in technology, business and politics.
shewire.chickclick.com

*Society of Women Engineers- An excellent resource for young women curious about careers in engineering.
www.swe.org

Teen Voices- This is the site of Teen Voices magazine, a great magazine created by teenage girls, for other teenage girls. This magazine focuses on real issues facing girls today.
www.teenvoices.com

Teen Wire- this site includes lots of information on issues that are important to teens, such as relationships, parents, stress, drugs and alcohol, and more.
www.teenwire.com

U.S. Small Business Administration’s Online Women’s Business Center- This site focuses on entrepreneurs. There are examples of women who have started their own businesses, and a quiz for youth to take to see if they, “have what it takes.”
www.onlinewbc.org

*Women of NASA- Designed to encourage young women to pursue careers in math, science, and technology.
http://quest.arc.nasa.gov/women

*Women in Science- This site includes profiles on women scientists, an international directory of women in science careers, as well as virtual tours through science labs and a database for young scientists to enter their future plans.
http://www.thinkquest.org/library/20117.shtml
Work 4 Women- This site includes strategies, tools, and networks for women, girls, employment training providers, and other workforce development professionals. Also includes, "Cool Jobs for Girls."

www.Work4Women.org

*Career role models and mentors included on these sites.
REFERENCES


