

# PRELIMINARY

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## Women in Computing & Information Systems

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### Abstract:

While technology has advanced in more recent decades, women have not shared in the successes that computer information systems has provided. Without the help of many significant female role models in computer information systems education, business, and industry, young women still hold the belief that computer and information science is an unattractive and "geeky" field of study. However, it should not be assumed that women historically have not had role models in computing, for the exemplary model was provided by the contributions of Rear Admiral Grace Hopper. Contemporary organizations have come into existence to help bring women into the computing and information systems discipline. These organizations have brought attention to the so-called cyber feminism movement. More than ever, resources and awareness need to be directed toward recruiting middle school-aged girls to study computing and information systems during their school years and beyond their graduation from high school. Female computing professionals need to become readily accessible to such students, and more programs like the ALICE project need to be created to draw focus young women's attention on the potential that women can have in the field of computer and information science.

**Keywords:** Gender Issues, Information Systems Education, Women.

### 1. INTRODUCTION

Women have made significant progress with their roles in American society over the course of the last two centuries. From gaining the right to vote to striving toward an equal role within the workforce, women everywhere should be proud of what has been accomplished. Still, there is much work to be done in order to achieve an equal share of power in our male-dominated society. There are many areas of American culture in which women still lack a presence. The computing and information systems discipline is one glaring example.

From a sociological perspective, women in America and in the western world in general have been labeled as being the 51% minority because although they outnumber males, they still do not have as much political power. Women have many challenges to contend with in their personal lives and in their professions because they are still battling all sorts of discrimination and harassment (Schaefer, 2004).

Women of a non-white race or ethnicity fall into two separate minority categories and therefore have the added issue of being considered a sociological "double jeopardy" (Schaefer, 2004). We will take a look at how this minority category classification affects women and computing information systems later in this paper.

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Women are grossly underrepresented in the United States government. In the 107<sup>th</sup> Congress, only 61 seats are held by women in the House of Representatives, a mere 14% representation. In the United States Senate, only 13 of the 100 members are women (About, Inc., <http://usgovinfo.about.com/library/weekly/a121198.htm>; <http://www.house.gov>).

It is clear to see that women have an overall challenge of being a minority in American society in general, even though they may outnumber men in this country. Should it then be a surprise that women lack an equal presence with men in the computing information systems field?

## 2. HISTORICAL PERSPECTIVE

As we look at the history of the computer industry, we note that women have had a greater hand in the development of computer technology in the past than what we might expect. For example, let us look at the contributions of one of the most notable women in computer and information science: Rear Admiral Grace Murray Hopper. Admiral Hopper is most recognized for developing the first computer compiler. She went on to help develop the programming language COBOL, and is infamous for coming up with analogies that have become common computer terminology today. One famous example of terminology she helped coin was "debugging" a computer, which she used after an actual moth was found in a computer in which she was working. While Hopper was regarded as the "mother of computing" and was awarded dozens of honorary doctorates, she found herself constantly having to reprove herself as a true computer scientist. She is quoted as saying "If you do something once, people will call it an accident. If you do it twice, they call it a coincidence. But do it a third time and you've just proven a natural law!" (<http://www.hopper.navy.mil/grace/grace.htm>). Her perseverance and determination helped to change the way we think about women in computing information systems and, ultimately, in positions of leadership.

While Admiral Hopper was a pioneer in computing information systems and helped open the door for women in the field from

the 1950's on, not many women have seized the opportunities to study or work in computing information systems in recent decades. This issue was finally recognized and publicized in the late 1980's, when the organization Women In Computing was formed and held its first national conference on the topic. About two hundred delegates met at the conference in July of 1988 to discuss the declining number of women enrolling in computing information systems courses at American colleges and universities. The purpose of the conference, and ultimately the foundation of the organization, was three-fold: to introduce an organization for women interested in computers to turn to for information on the field; to give women already in the field an information source; and to push for the computing industry to overcome discrimination issues, whether they be based on age, gender, or race (Leeming, 1989).

## 3. THE PROBLEM

Gender inequality in computing information systems is not just a domestic issue, but an international one. A recent case study and subsequent report reported that similar issues of a lack of existing women who study or are employed in computing in the United Kingdom. While females have outnumbered males in post-secondary educational enrollment, and the overall number of students studying computing information systems had greatly increased during the period from 1994 to 2000, women still have had a shrinking presence in the U.K. information systems classes over those same years. The case study found that not only were women underrepresented in computing information systems courses and in technology jobs, those women who did make it into the technology job field were often given menial jobs that rarely involved anything more than simple word processing tasks. With such unattractive tasks associated with their jobs, many women lacked motivation to continue their careers in the computer field (Clegg and Trayhurn, 2000). The same report also looked at women in several other countries and found striking results. In a five year period spanning 1985 through 1990, the percentage of women in computer and information science, information technology, and related fields dropped in twelve of

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nineteen countries observed (Clegg and Trayhurn, 2000).

In the United States, organizations continue to form to defend women in what is being called a 'cyberfeminist' movement. Many male leaders in more recent years have brought to the nation's attention the age-old debate over whether or not a biological difference in the sexes is the real reason to blame for the shortage of women in computing information systems. Those who support this point of view contend that while men have a less sensitive nature, they are more willing to interact with inanimate objects longer than a woman would (Leeming, 1989).

Cyberfeminists, led by Sadie Plant (author of *Zeros + Ones: Digital Women + The New Technoculture*), believe that the exact opposite of this biological point of view is true. Plant once exclaimed that technology is "inherently feminine" because of the way that computing information systems works through networks. She calls this network a sort of "connectionist computing information systems" that is in sharp contrast to our conception of masculinity but that conforms completely to our ideas about femininity (Dery, 1999).

Dery, writing in the *Journal of the Theoretical Humanities* on the topic of cyberfeminism, points out how ironic an argument like Plant's can be. While males strongly believe that men have a stronger biological capability to manage technology, the followers of cyberfeminism hold the same belief, but cyberfeminists consider women as being biologically superior to men when it comes to dealing with technology (Dery, 1999). These "biology is destiny" ideas merely fuel the debate over the superiority of one gender over another, regardless of how belonging to one of the gender groups applies to a specific area of life. However, we must be aware that these ideas exist and that they are used by some to explain the dearth of women in the computing information systems field of study and work.

Regardless of your position on this debate, it is important to look at other cyberfeminist organizations in order to learn of their contributions towards helping women

become successful in the computing information systems field. For example, the Million Women March, held in Philadelphia, PA, in October 1997, focused on minority women's rights in today's society. One of the major factors that led to the promotion of the event was a network of websites created by supporters of the march. There is no surprise that a large portion of those websites were created and maintained by minority and especially African-American, women (Everett, 2004). The promotion and success of this event is important when discussing women in technology for two related reasons. First, the fact that it was organized by minority women is significant in a sense of the double jeopardy factor mentioned earlier. Second, the march came at a time when there was great debate about the so-called digital divide. The digital divide in this country has come to take on many different meanings, but a central variation is the inaccessibility of technology to minorities in low income neighborhoods. This actually presented another hurdle for the event organizers to overcome: since a large percentage of the women for whom the march was intended did not have access to the technology used to promote the march, supporters who did have Internet access printed the web pages and circulated the information physically (Everett, 2004).

#### 4. POSSIBLE SOLUTIONS

As a response to the growing number of small businesses being owned and operated by women, a group known as GirlGeeks was founded (Calicchio, 1999). Sponsored by the Bay Area Video Coalition, GirlGeeks looks to extend educational opportunities to not only women, but also any other "traditionally underserved segments of the population" who wish to learn more about technology and computing information systems. Through the GirlGeek website ([www.girlgeek.org](http://www.girlgeek.org)), site visitors can receive technology training; obtain information on and receive certification by several well-known technology certification bodies; find outreach programs and support groups for girls and women who could benefit from such organizations; and find more information about technology classes and workshops (GirlGeeks, 2005).

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In an interview with Dr. Deborah Whitfield, professor and assistant Computer Science Department chairperson at Slippery Rock University, Dr. Whitfield identified why she believes that women avoid computer and information science, why there is such a low percentage of women representation in computer and information science departments at American universities, and what she believes could be done to help draw more young women into the computer field. She believes that women avoid computer and information science because of the preconceived idea that all computer and information science careers require long hours of staring into a screen and programming for extensive periods of time. This preconceived idea has a 'geeky' quality to it that women find unattractive and therefore avoid (Whitfield, 2005).

## 5. RECRUITING WOMEN

How can universities recruit more women to study computer and information sciences? The best article to date on this subject is "Priming the Pipeline" (Jepson and Perl, 2002); in fact, this article should be recommended reading for all university educators because it has the most comprehensive list of suggestions. As for the university that has had the most success in this field, Carnegie Mellon University stands out (see Fisher, Margolis, and Miller, 1997, and Fisher and Margolis, 2002 for details).

Dr. Whitfield believes that the solution involves reaching out to young girls while they are still in middle school. She does not believe that colleges and universities are performing outreach effectively, especially at Pennsylvania area universities. Having women who are actively employed in the information systems field make visits to middle school classrooms, they can showing girls that even computer programming can be enjoyable. These visits to future female students will help to change the declining numbers of women in computer and information systems field (Whitfield, 2005).

Dr. Whitfield also pointed out that girls may be more inclined to enter technology and computing information systems fields if they were exposed to more female professors and

computer and information systems professionals at their universities and in their places of employment. A case in point is the fact that only two of the eleven computer and information science professors at Slippery Rock University does not help in encouraging many young women to declare computer and information science as a major (Whitfield, 2005).

To encourage more young people, not just girls, to enter the world of programming and to do so more gracefully, the University of Virginia and later Carnegie Mellon University developed the Alice Project: a visual programming language (Carnegie Mellon University, 2005). Sponsored by such famous corporations as Intel, Microsoft, Chevron, NASA, and Pixar, the mission of the Alice Project is to "address both the mechanical and sociological barriers that currently prevent many students from successfully learning to program a computer" (Carnegie Mellon University, 2005). Alice does this by allowing for a free programming environment that does not rely entirely on correct code syntax. Instead, programmers use animated graphics to construct actual programs. The programs allow for storytelling in the actual programming activity and in the resulting program, which according to the Alice Project website is motivational and exciting for middle school girls. The Alice Project website provides very educational and entertaining videos on this very intriguing product (<http://www.alice.org>).

## 6. CONCLUSION

Although women have always had a hand in the development and implementation of the computer and information sciences, the number of women in the computer fields has steadily declined in several nations, including our own. After first being identified as an issue in the late-1980's, many organizations have sprung up to help spread information to women about the world of computing information systems. The cyberfeminism movement has helped spark women to get more involved in computing information systems. Still, more attention needs to be directed toward middle school girls who will hopefully one day

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become the future leaders in the computer and information science field.

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