GENDER STRATEGIES IN RECRUITING AND RETAINING WOMEN IN INFORMATION TECHNOLOGY

By

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ABSTRACT

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The purpose of this study was to research selected strategies for recruiting and retaining women in information technology (IT) professions. This study includes a comprehensive review and critical analysis of research and literature associated with the strategies in recruiting and retaining women in IT professions. A summary was presented and recommendations made to educators and employers on improved practices in the recruitment and retention of women in the IT professions.

The summary portion of this study addressed the critical issue of increasing the number of qualified women prepared to meet the workforce demands and opportunities of the future.

Recommendation were made to help women believe in their abilities for success by outlining individual recommendations designed to increase the awareness of women's underrepresentation in technology and to impact the further involvement of women in the field of information technology.

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CHAPTER ONE

Introduction

In a report conducted by the U.S. Department of Commerce, the United States has shown massive expansion in Information Technology (IT) related industries. Indicators show continued growth as a result of the transformation into a knowledge-based economy (U.S. Department of Commerce, 2001). Much of this growth can be directly related to the globalization in world communications, the increase of organizational mergers and partnerships, the merging of various populations within national boundaries, and the increasing traffic of individuals to different countries around the world (Granger, Little, & Lippert, 2002).

Technology has created long-term economic growth since World War II, with IT becoming one of the most important enabling technologies in the world today (U.S. Department of Commerce, 2001). In 2002, managers responsible for hiring technology employees expect to have more than 1.1 million technology jobs available. These managers also predict that over 600,000 of those jobs will go unfilled due to lack of qualified workers (Steen, 2002).

Technology-based changes in the economy have created new opportunities, with IT fields growing faster than the

overall growth of the American work force according the Bureau of Labor and Statistics (cited in Gordon, 2002).

With economic growth and the technology explosion, employers face severe shortages in skilled IT employees that meet their employment needs (Repsher Emery, 2002). This shortage makes it even more imperative that there be skilled resources to meet the IT industry employment demands (*Shortage of IT professionals*, 2002).

The National Science Foundation has predicted that by 2010, one in four employment positions in America will require computer literacy, with higher paying jobs requiring more technical fluency (Justine & Barr, 2002). While increasing numbers of women of all ages use various forms of technology (e.g. computers, cell phones, software programs, the Internet) for communications and research (Harcourt, 2002), men have been predominately involved with IT professions such as fixing, designing, programming, and engineering future uses of technology (Rogerson & Stack, 1997). Currently over 90% of the engineers who design and engineer Internet systems are men (Mayfield, 2001).

Women have been, and are still, very underrepresented in the IT profession (*The supply of information technology workers in the United States*, 1999). Serious consequences occur not only to women's overall potential, which is not

fully realized, but also to the world's economy that might have been shaped differently with more involvement from women in the area of technology. The consequences for the U.S. economy are significant. The shortage of technology workers may cost as much as four billion dollars per year in lost production for the United States (*Valuing Diversity*, 2000). "If we continue to utilize the talents of American women - virtually half the population - at the level we are now, we will not have the workers we need in this country," says Arthur Bienenstock, associate director of science in the White House Office of Science and Technology Policy (cited in Gaudin, 1999, n.p.).

The gap created by poor representation of women in technology professions is partly due to the low percentage of women participating in and seeking out degrees in technology (Radcliff, 1999). A study done by Camp (2000, n.p.), a professor at the Colorado School of Mines predicted that "while undergraduate enrollments in computer science will increase rapidly, the proportion of women in that enrollment is unlikely to rise" even with increased diversity of IT occupations. There is a disturbing trend within the share of all computer degrees awarded to women. Degrees awarded to women have fallen from a peak in 1984, of 35.8 percent, to 27.5 percent in 1994. There was a

slight increase in 1996 to 28.4 percent (Taskforce on Workforce & Education, 2002).

There are more opportunities to enter the technology industry from a wide range of backgrounds (Rogerson & Stack, 1997). Professions in IT now include jobs in the areas of systems management, communications and networks, systems development, technical support, operations, user support, and help-desk operations. "The relationship between women and technology must change, for the sake of women, and for the sake of technology. IT has reflected the limitations of the group that builds it (largely first-world men)" (Justine & Barr, n.d., n.p.).

"While there are women achieving stunning success in the high tech industry, they appear to be the exception rather than the rule" said Molina (2002, n.p.).

> There is no question that the ratio of men to women in the high technology fields shows an obvious gender gap. In a world where there are too few skilled people to fill a large number of positions, we must be able to tap the entire population (both men and women). It is, therefore, important to understand how we can attract and keep women in the field of IT. (Lyons & Williams, 2002, n.p.)

There is definitely a problem of drawing more women into the technology workforce and, more importantly, retaining them. Currently females in the IT field make up only 29% of the workforce, which has dropped from a peak of 40% in 1986 (Burns, 2002).

If IT attracted the same number of women as men, there would be no shortage of skilled high-tech workers (Gaudin, 2000).

Statement of the Problem

The recruitment and retention of women in IT professions within the United States is presently a serious problem for the IT professional field. Identification of gender strategies and best practices for recruiting and retaining women in IT professions will increase the numbers of women trained and knowledgeable to meet the IT work force needs and will impact future technology developments.

Purpose of the Study

The purpose of this study was to research selected literature associated with recruiting and retaining women in IT professions. This was done during the summer of 2002 by performing a comprehensive review and critical analysis of literature pertaining to this subject.

The second purpose of the study was to formulate a set of recommendations to educators and employers regarding

improved practices of recruiting and retaining women in IT professions.

Research Objectives

There were two research objectives this study attempted to answer:

1. To identify which factors affect a women's decision to enter and stay in IT.

2. To determine which strategies impact recruiting and retention of women in IT.

Significance of the Study

Identification and implementation of gender strategies for recruiting and retaining women in IT professions is significant for the following reasons:

1. The analysis will contribute additional information to research already performed on the subject of gender inequalities in IT.

2. The findings will provide ideas for increasing the number of women trained and knowledgeable to meet the IT work force needs that impact future technology developments.

3. The data collected from the findings may be used for other male-dominated professions.

Assumptions of the Study

Several assumptions have been made during the course of this analysis and are as follows:

1. This analysis assumes that the information collected from various research sources is accurate.

2. This analysis assumes that there are recruiting and retaining strategies for women in IT.

3. This analysis assumes that businesses are concerned and committed to recruiting and retaining women in the IT professions.

4. This analysis assumes that the term, Information Technology (IT), is used consistently throughout research to describe industries that encompass computers, software, telecommunications products and services, Internet and online services, systems integration, and professional services companies.

Limitations of the Study

Due to the expansive amount of information available on the subject, this study was not intended to be all-inclusive. Therefore, this study concentrated on selected strategies for recruiting and retaining women in the Information Technology profession within the United States. Information recorded reflects results of the research done by others in this area of gender equity.

Definition of Terms

For clarity of understanding, the following term has been identified.

Information Technology (IT) as defined by (Information Technology Association of America, 2002, n.p.), is "America's fastest growing industry, encompassing computers, software, telecommunications products and services, Internet and online services, systems integration, and professional services companies."

CHAPTER TWO

Review of Literature

Introduction

A problem analysis approach was taken in examining the literature on recruiting and retaining women in the field of information technology. First, factors were identified that had an impact on a women's decision to enter or not enter technology-associated careers. Secondly, a survey of recruitment and retention strategies was made along with a review of their impacts on various groups.

This analysis will make frequent references to males and females, to boy and to girls, and to young men and women. These references refer to populations and not individuals with the understanding that all people are unique regardless of their gender.

Identification of Current Involvement in IT

The first step in identifying the factors affecting women's underrepresentation in IT is to understand the current involvement of women and men in IT.

As the field of information technology continues to evolve, it creates changes in all aspects of lives for men and women. Although both men and women are affected by technological changes, men have had the greatest impact on technology through predominate involvement with the design

and creation of new technologies. These new technologies immensely affect and shape our world and tend to be most effective when designed from multiple perspectives and ideas and most importantly when designed with an understanding of the users' needs (Schneiderman, 2000).

The gap of women in IT fields result in a male dominated perspective in the development and design of technology. This gap also "translates into loss of opportunity for individuals, a loss of talent to the workforce, and a loss of creativity in shaping the future of society" (Cuny & Aspray, 2000, n.p.). Low percentages of women in IT also serves to discourage any available talent from entering IT careers making the resource pool even smaller and less attractive.

Technology tends to double itself every two years, creating massive amounts of information and opportunities. Future opportunities that cannot even be imagined today will have profound effects on society. Beyond computers and beyond cell phones, those without knowledge of technology will be unable to compete for future technology employment positions (Borg, 2002).

The gap between women and men in IT professions is not a new phenomenon, but, rather, has been an active area of interest and research over the last 12 years, creating

substantial amounts of information on the subject. Since the 1980's when computers entered our work area, schools, and homes, gender differences have been present but more pronounced at the higher levels of education (Crombie, 1999). Much research has been done, articles have been written, and databases formulated, and yet the same questions are asked regarding women's underrepresentation in IT. What is it about IT that discourages women from entering and staying in the IT profession? What positive actions can be taken to increase and maintain the number of women in IT?

Contributing Factors

Underrepresentation of women in the IT workforce is not the result of just one factor but several factors (Carver, 2000). Factors such as perceptions, stereotyping, self-confidence and the availability of role models and mentors all contribute to the underrepresentation of women in IT.

Perceptions

Much of the research done in the United States on recruiting women into IT suggests that perception of the field of technology as unappealing. In a study done by the American Association of University Women (AAUW), girls and young women reported technology-related careers unappealing

because they were associated with jobs that were "solitary," "passive", and sedentary" (Taggart & O'Gara, 2000, n.p.).

The unattractive perception of technology professionals in our culture continues to foster an image of a geek without social skills and confidence. Teachers, counselors, and parents tend to steer female students towards professions in health, law, or business and away from computers and technology. Their perceptions regarding technology careers are influenced by what they believe about that profession. This can be seen in all aspects of our lives from sports, social behaviors, and academics (Klawe, 2002).

Stereotyping

Women continue to be depicted in the media as "half-clad" and "half-witted" in need of rescue by an attractive man. People may not realize it, but many of their expectations of men and women are rooted in what they observe and by what messages their society presents (Adelson, 1990, n.p.).

Society regards males and females differently and has stereotyped associated traits such assertiveness, confidence and achievement with masculinity and not femininity (Spertus 1991). Employers seeking to fill

positions in IT have placed great value on masculine traits when seeking to fill positions in IT.

IT employers usually demand long hours and sometimes a great deal of overtime, which is usually objectionable by most women because of family life (Bellinger, 2002). Attraction to the IT is also hindered because there are so few well-known women already in the field that can serve to attract others (Camp, 1997).

Women have played an important role in the development of technology but their contributions have not been well documented in the past. Women have had major influences in designing and programming the first computers that ever existed. Women such as Augusta Lovelace who is credited for being the first conceptual programmer and Grace Hopper who is admired and respected for pioneering programming languages such as COBAL, one of the first programming languages to work on the electronic computers. Women such as these two laid the groundwork for women's involvement in technology (Gurer, 1995).

Confidence

At the preschool and elementary levels gender differences towards computers do not tend to exist. In later years gender differences becomes obvious and can

usually be attributed to the amount of exposure to computers (Corston & Colman, 1996).

Studies show that experience with computers tends to promote interest in using the computer for other uses primarily in entertainment. Research from the study Electronic Games for Education (E-GEMS) provides insight into gender confidence with computers in direct relationship to how much time was spent using a computer. The more time spent on a computer becoming familiar with the program or games, the more confidant the users became with using the technology (Klawe, 2002). Attitudes towards technology can be greatly affected by experience and those spending more time at computers at home, work and school have more positive views towards technology then those with less exposure (Corston & Colman, 1996).

Content of electronic games and toys tend to be developed with an overwhelming dominance of boy-themes intended to attract young male players. These games tend to quickly lose the attention of young females, but young males continue to play these games at an early age forming a comfortable relationship with technology while girls miss this early interaction with computers (Gorriz & Medina, 2000). Without interaction with computer programs and games young women also are unfamiliar with jargon young men

use and become familiar with when relating to computers and software.

Young men obtain more experience with computers but they also differ in the type of experience they are assimilating. Young women tend to concentrate on their studies when using computers to improve their grades while young men tend to perform more hand-on work like fixing and adding new applications. These efforts help them gain confidence when dealing with real life technology situations (Hearne & Martin, 1989).

A lack of self-confidence is a major factor causing women not to enter the technology field. Confidence in ones personal ability stems from past performances and accomplishments, what has been observed and learned from others, freedom from fear in performance, and what types of support and guidance was received from others (Ambrose, Lazarus, & Nair, 1998). Traditionally, young women have been taught from an early age that their role in society is to act lady-like, a counterproductive quality when competing with young men for computer and instructor time in the classroom. Without enough use of the computer to build confidence and assistance from the instructor on questions, frustration builds, and young women begin to dislike computers (Bernstein, 1997).

Women feel inadequate placed in environments where others appear to know more then them. Intense competition found in higher education also acts to decrease self-confidence and the actions of teachers and professors can serve to future decrease self-esteem. Women entering education in the field of technology enter with a high level of interest and enthusiasm but leave the same programs with very low levels of self-esteem (Pearl et al., 1990). Studies show that young women fall behind their male counterparts in technology confidence by the time they reach high school (Corston & Colman, 1996).

Role models and mentors

Women know about being journalists, doctors, pilots, astronauts, lawyers, and nurses from seeing these professional women on television programs and from family and friends who are currently in these professions. They serve as role models and mentors to other women and help to attract them into those fields. In IT there are far fewer women visible in the media or at home, among family or friends to serve as role models and mentors in attracting women into the IT field (Jepson & Perl, 2002). The simple action of providing sincere and genuine encouragement to other women can change the way a woman relates to the IT profession. Mentors can be found in all shapes, sizes and

genders but the characteristics and skills that make for some of the best mentors include: listening, observing, problem solving, approachability, availability, support and understanding (Childress-Townsend, 2002). Many mentoring programs have taken to the Internet and e-mail in a process called telementoring providing breakthroughs from barriers of time and distance (Pathways, 2002). One example of this type of telementoring program is called MentorNet, which is an electronic mentoring program that for one year pairs up students in undergraduate and graduate studies with experienced professionals that volunteer to guide and give advice, support and encouragement to students via e-mail. MentorNet is administered by the Women in Engineering Programs & Advocates Network (WEPAN) and can be contacted at: http://advancingwomen.com/wk_mentornet.html.

Women's organizations can also serve as a foundation for increasing the visibility and prestige of women already in the field. The prime motivation behind these organizations is to serve as resource and support communities for women in technology dealing with issues such as the glass ceiling, pay differences, support for balance between work, family and education. Each organization has its unique mission and target and are usually funded by industry sponsors, foundations, and

professional organizations. Some of these organizations include the following:

ACM-W: ACM Committee on Women in Computing

Established in 1991 ACM's main mission is to provide programs, activities, and information for all women in technology. Their website can be found at: www.acm.org/women.

CRA-W: Committee on the Status of Women in Computing Research.

The Computer Research Association (CRA) established the CRA-W in 1991 with the focus of targeting programs to women already in the field of technology. Their website can be found at: www.cra.org/Activities/craw/.

IWT: Institute of Women in Technology

Founded by Dr. Anita Borg in 1997, this organization seeks to increase the number of women in technology by increasing the positives affects of technology on the lives of women. Their website can be found at: www.iwt.org.

AWC: Association for Women in Computing

The AWC strives to provide opportunities to all women in technology through local and national chapters. Their website can be found at: www.awc-hq.org.

The three goals of the AWC are to:

1. Promote communications among women.

2. Further the professional development and advancement of women in computing.
3. Promote education of all women of all ages.

WITI: Women in Technology International

The WITI is an international organization that provides education, conferences, on-line services, publications, and resources to its members. Their website can be found at: www.witi.org/center.

Even with the demand for technology personnel, few women hold senior positions in technology. This is partly due to the fact that there are few women in technology, but other indicators point to discrimination, harassment, and differences in priorities between men and women (Teague, 2000). Though most forms of discrimination in the workforce can be classified as … "accidental, unintentional, and unrecognized"(Hemenway, 1995, p. 55-58), discrimination does exist. In the report by the AAUW, based on a national survey conducted by Harris Interactive of over 2,064 public school students in grades 8-11, 83% of girls and 79% of boys responded with already experiencing some sort of harassment from within the school system (AAUW Educational Foundation, 2001).

School Systems

Beginnings with preschool and into the early years of grade school both boys and girls tend to have positive attitudes towards interacting with computers (Bulkeley, 1994). Somewhere between third grade and high school, gender differences become noticeable where male students remain attracted to computers and female students feel less comfortable around them (Stanley & Stumpf, 1997). Working with computers tends to take on a male stigma where boys feel comfortable monopolizing the keyboard and mouse of the computer and girls feel more comfortable sitting back and watching.

It's important to note that at this time, girls lose out on exposure to individual computing time and begin to show signs of lost confidence in their ability to work with the computers (Hearne & Martin, 1989). Intervention by teachers and parents is critical at this juncture in the education process to assure young men and young women receive equal access time to the computers and that previous biases towards computers are not fostered. Interests can and have changed towards computer technology usually after repeatedly seeing both female classmates and female instructors proficiently using and teaching the technology (Bernhard, 1992). While in high school, female

students spend less time on computers and are more frequently apt not to take courses in technology, which serves to widen the technology gap even further. Sandy Bernard, president of the AAUW is quoted as saying that despite progress to change, the gap persists, "The gender gaps we see are evidence that public schools are failing to fully prepare girls for the 21st century. High schools still tend to steer girls and boys into School-to-work programs that prepare them for traditional occupations for their gender", (cited in PR Newswire, 1998, n.p.).

Fewer women are entering higher education to pursue technology related courses and for those that do make it into colleges, factors that work against retaining these female student in technology studies include feelings of isolation, few female peers to work with, lack in some areas of computer experience, and lack of role models and mentors (Carver, 2000). Women usually report a loss of interest when transferring out of computer science courses yet findings indicate a drop of confidence based on unfavorable comparisons with others is usually the reason for leaving the courses (Fisher & Margolis, 2002).

Community colleges have stepped up to the plate to help bolster women's underrepresentation in technology courses. Currently, community colleges enroll nearly half

of all undergraduate students and have the ability to influence women as they pursue through their educational interests (Chang, 2002). Attention will be given to areas such as course work relevance, restructuring curriculum, providing laboratory experiences and collaborative real-life applications to working environments (Farrell, 2000). Finally, community colleges will also be trying to increase the transfer rates between two-year community colleges and four-year colleges through articulation programs, which are negotiated programs between high school, two-year colleges and four-year colleges that agree to accept credits between the schools for application towards completion requirements.

Strategies in Recruiting and Retaining

With still an unmet demand for qualified people in technology with women representing the minority in the profession, one way to meet demand is to encourage women to enter the field of technology with many new opportunities. IT positions in the future "will demand business aptitudes, people orientated skills and multi-tasking management potential more than technical ability" (Teague, 2000, n. p.).

Reasons for choosing an IT career fall into influences that caused women to consider technology and the attributes

of the women themselves. Schools, family, careers, and personal experiences can serve to encourage interest in IT.

Strategies used to recruit and maintain women in technology must address those factors that deter women from entering and staying within the field. Factors such as perceptions, stereotyping, self-confidence and availability of role models and mentors and school systems are key to making these strategies work.

Strategy # 1.

Focus on preschool, high school, and college

- Reverse the negative perceptions of the technology field early in the life of young women and make it stylish to work with computers (Pasternak & Thornburg, 1999).
- Change the image of technology from a geek stereotype to a social image that is useful, interesting and full of new ideas and challenges. Make it clear that technology is a field for both men and women (Pasternak & Thornburg, 1999).
- Implement school curriculum that ensures appropriate computing skills and provides challenging projects of interest for both men and women. Refrain from assuming computer skills in introductory courses and provide tutoring

services for those students that may need to catch up with the rest of the class (Bernstein, 1997).

- Provide different ways to enter curriculum by providing courses for non-experienced students that allow them to narrow the experience gap (Fisher & Margolis, 2002).
- Change admissions policies not to require prior technology experience as prerequisites to entering technology courses (Fisher and Margolis).
- Broaden the definition of technology to show relationships to other areas of interest such as design, music, and communications.
- Encourage all women classes whenever possible to increased enrollment and produced more positive attitudes towards their abilities in technology (Crombie, 1999).
- Be careful to insure all students have equal access and opportunities to work with computers. Strive to create positive fun experiences that learners can carry with them through life (Fletcher-Flinn & Saddendorf, 1996).

- Finally, vigorously recruit girls/women, friends and family into technology courses.

Strategy # 2.

Educate parents, teachers and counselors

- Parents and teachers tend to treat girls and boys differently and need to be trained on how to act on these predefined roles by allocating equal time, equal assignments, and equal roles to both sexes (Huber & Scaglion, 1995).
- Train instructors to work in a bias-free environment and to evaluate their own behaviors to identify biases in the classroom that treat men and women differently (Unrau, 2001).
- Encourage instructors to equally call on men and women and to assign challenging tasks to both genders (Klawe, 2002).
- Create safe learning and working environments that are women friendly by enforcing policies that ensure learning and working areas are clean, well lit, and safe (Fisher & Margolis, 2002).
- Try to pair women together when working on computer projects to promote socialization and support. The all-female classes also increased

enrollment and produced more positive attitudes towards their abilities in technology (Crombie, 1999). When in the presence of female educators, girls with little or no exposure to computers performed well and reported positive attitudes (Corston & Colman, 1996).

- Create workshops for parents, teachers and counselors on today's inadequate practices that favor their sons and not their daughters. Show them how to influence their daughters by creating positive experiences with technology and to encourage computers in the home. Many parents, teachers, and counselors are unaware of the biases that exist (Crombie, 1999).
- Encourage open door policies for expressing complaints to serious matters in order to reduce discrimination in the learning and working environments.
- Encourage guidance counselors to work with teachers, administration, parents, and students to provide more access to information regarding technology careers and to express the importance of technology education in today's world. Silverman and Pritchard (1996) offer several

ideas for counselors and educators to use when promoting prospects into the various technology careers.

a) Provide more information to students and parents about salaries, work requirements, and promotion aspects.
b) Promote events such as career days and job fairs and strive to attract female role models working in non-traditional occupations to talk with the students (Sanders, 1994).
c) Coordinate efforts to visit higher education open houses to familiarize students with classrooms, equipment, and facilities (Sanders, 1994).
d) Promote discussions between counselors and technical education instructors to obtain more information about the class structure and what students will be doing in class.
e) Bring in guest speakers, preferably females, into the technology classes to discuss real life work experiences (Carlstead, 1996).

f) Promote links between business and industry that can provide opportunities for field trips, job shadowing and internships (Sanders, 1994).

Strategy #4

Focus on family and work support systems.

- Coping with the demands of balancing work and family can be better addressed by creating flexible family support structures providing resources. Affordable on-site daycare, support for maternity leave for both parents, facilities for nursing, accommodations for part-time work and school enrollments for parents with children (Brady, 2001).
- Encourage all-women informal club meetings focused on technology to discuss common topics and to provide support in a stress free environment. Women often find it difficult to bond with men they work with due to different interests outside of work, which include sports, and compounds the alienation women feel in the office (Spertus, 1991).

Strategy #5

Building confidence through experience

- Early experience to computer basics, jargon, and programs will help to make women more comfortable around computers. Sites such as the Girls Scouts Internet web site help familiarized young women with technology jargon (Girl Scouts, 2002).
- Provide early intervention through the form of computer camps, workshops, and special programs that focus on making computers available to women in a non-threatening way (Sanders, 1994).
- Provide courses that allow students to catch up in certain areas to meet prerequisites for entry-level courses and employment positions and to apply real-life experiences while working on projects. Seeing a practical application of technology during their experiences help women decide to enter IT (Fisher & Margolis, 2002).
- Highlight software and games that promote a positive experience with computers by encouraging product developers and designers of software and games to create products aimed specifically at women interests. Research done by a software company named Girl's Inc. (Austin, Texas),

reveals interesting preferences young women have towards software:

- Refused to read software manuals when questions arose. Preferred to seek help or move to other software.
- None of the girls expressed a need for closure before moving on to the next piece of software.
- Instead of completing a level of a game, girls preferred to wander within the software environment.
- Quality of visual and audio presentation important to all girls.
- Participants expressed and need for a challenging but not impossible task to complete.
- Younger participants enjoyed the game oriented software while older girls enjoyed the educationally focused software.

Strategy #6

Mentoring and role models

- Focus on providing mentoring programs for women of all ages by supporting the integration with already existing programs and encouraging support

to bring in as many technology mentors as possible. Mentoring programs have been shown to help in recruiting and retaining women in technology (Sturm & Moroh, 1994). Although men serve as excellent mentors, studies indicate the a higher sense of comfort and freedom are achieved when women mentor other women and girls (Fossum & Haller, 1998).

- Affect the number of women in technology through role models. Women are more prone to choose a technology career with the presence of successful women encouraging them (Fossum & Haller, 1998).
- Implement visits by well known successful women in technology to provide presentations on their areas of expertise and to discuss topics of interest because support and encouragement are important to women making non-traditional choices. Women need to see other women in successful careers where success is measured not only in technical expertise but also in the lifestyles they live (Townsend, 2002).
- Expose women to biographies and stories of successful women in computing because having women in power helps those who may just be

starting in the field of technology (Fossum & Haller, 1998). Oftentimes female pioneers in the field of computers go unnoticed for their achievements.

- Along with mentoring and providing role model support, a new phenomenon called support communities serves to bring women of similar interests and concerns together through either physical or virtual meetings. The activities of the different communities vary but provide professional and social support, networking and recognition needed for women to remain in the technology field. These communities continue to flourish and provide recognition for women's achievements that might have otherwise gone unnoticed (Gabbert & Meeker, 2002).

CHAPTER THREE

Summary/Conclusion/Recommendations

Summary

Gender biases can be uncovered and appropriate reforms put into place, but there is no single reform for reaching gender equity in technology. Gender equity in any form is complex with many different aspects that have been embedded into society for many years. There is no magic pill for quickly changing women's interest towards technology careers. By systematically addressing the many factors that have shaped society over time, reforms can be initiated to make technology more attractive to the needs and interests of young women (Welty & Puck, 2001).

Most of women's interactions with the world are influenced by what women believe about it. When women believe they will succeed they are more likely to do so and when they believe they will fail, they are most likely to be unsuccessful in their endeavors. Helping women believe that they can succeed in IT is critical and can make all the difference in preparing the workforce for the demands and opportunities of the future.

There is a vast pool of untapped talent in the United States among women, which must be addressed in order to ensure our workforce is prepared to meet the employment

demands of the future and make positive contributions towards it.

While the number of women in the workforce has almost doubled since 1950, women are still concentrated in traditionally female positions that typically pay lower and have fewer benefits and opportunities for advancement. Today women are more likely to provide financial support for themselves and their families for a variety of reasons need to understand that careers in technology pay well and provide opportunities for advancement.

Conclusion

The nation as a whole should be concerned with the declining numbers of qualified people capable of filling IT employment positions in the future. Currently women are largely underrepresented in the IT profession. IT industries account for a large portion of the U.S. economy, and the Bureau of Labor Statistics predicts that there will be a demand for an additional one million IT workers in the future. Women make up fifty-two percent of the population and create an untapped source for productive, creative, and intelligent people for the IT industry.

Only 83 years ago, women did not have the right to vote (WorldBook, 2002). Today, women face an even more menacing future without an active contribution to the

evolution of technology changes. Women need to recognize they have the power to make a change and address the current labor shortage for technology-oriented jobs in the United States and create positive outcomes for the future.

There is no doubt that technology has become part of society and provides opportunities for people in jobs and everyday life. There are noticeable difference in the use of computers between men and women and this seems to be attributed more to male adolescent culture than with feminine values and goals (Kiesler, Sproull, & Eccles, 1985). Career choice is not the result of one single event but a culmination of several experiences for women.

Recommendations

These recommendations are made to increase the awareness of women's underrepresentation in technology and to impact the further involvement of women in the field of information technology. It is hoped that these recommendations will work to recruit and retain women in IT and ultimately assisting education and employers in filling IT employment positions of the future.

For Education

From active recruitment stems the most effective solution for attracting and retaining women in technology. The following list of recommendations serves to assist

school systems and their staff through the process of attracting and retaining women in technology:

1. Actively recruit women to increase female participation in technology programs.

2. Provide articulation programs between high school and two and four year colleges.

3. Encourage educator and counselor awareness of unintentional gender biases in the classroom and towards careers in technology.

4. Respect differences in preferences in computer use and activities.

5. Provide suitable lab and classroom environments that promote fairness, safety, cleanliness, and politeness.

6. Create assignments that appeal to both men and women that apply practical real life experiences.

7. Modify courses to assist in developing confidence and understanding of appropriate concepts and skills in technology.

8. Schedule flexible class offerings that support childcare and telecommuting in order to manage both work and family.

9. Expose female students to female technology educators whenever possible.

10. Encourage all women groups to foster support and exchange of experience and knowledge.

11. Provide guidance counselors with information on careers and necessary skills in technology.

12. Provide childcare services.

13. Encourage women students to hold positions of authority and power in the technology labs and clubs to establish confidence and experience.

14. Support mentoring programs to encourage interest in technology.

15. Provide learners with clear feedback concerning their quality of work and refrain from discriminatory practices (Pearl et al., 1990).

For Family

1. Encourage family awareness about computer biases and stress equal access by both genders.

2. Encourage parents to raise demand for games aimed at girls to encourage computer use.

3. Support computers in the home and provide equal access to all family members.

For Business

1. Encourage product and game designers to seize market opportunities in products designed for girls.

2. Strive for diversity when establishing in-house creative and development teams.

3. Support mentoring programs within and outside of the organization.

4. Provide resources for organized talks designed to expose women to successful women.

5. Review hiring practices and support recruitment of qualified women into technology positions.

6. Change marketing efforts to reflect women in a more positive role.

7. Provide on-site daycare facilities whenever possible to avoid long travel distances for daycare.

8. Support telecommuting by providing in-home offices for those employees with small children or long commuting distances.

9. Support flexible working hours to allow employees options when managing the demands from their children and work.

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