Interventions and Solutions in Gender and IT

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INTRODUCTION

The role of women in technology-related fields began with promising contributions from pioneers like Grace Hopper. In recent years, women have moved away from information technology (IT) fields, and the number of women selecting IT majors in universities continues to decline. Likewise, the number of women employed in the IT workforce remains low and declining.

Researchers have recognized the problem and have investigated the many reasons for low participation of women in IT-related fields. Researchers have proposed various interventions to fill the pipeline and retain women in computing.

In this chapter, we provide an overview of the current state of women in IT. We focus on girls and women at various life stages, from early education to the IT workplace. We also provide a discussion of the various methods and appropriate interventions that may be employed to encourage women to become empowered users of technology worldwide.

We use a broad definition of IT, which includes computer science (CS), computer engineering, information systems (IS), information technology (IT), and related professional fields. By examining research from multiple technology-related fields, we gain a clearer picture of the many ways that women may participate in IT.

Recent research on gender and IT has used an interdisciplinary approach, which has greatly expanded our potential for understanding why women decide not to pursue IT-related fields and how to implement appropriate interventions. Researchers from topics as diverse as IS, psychology, social sciences, education, and feminism, have taken a distinctive approach to understanding why women are not better represented in the IT workplace. We believe this broad, interdisciplinary approach has great potential to understand motivations for women pursuing IT-related careers. As Trauth & Niederman (2006, p. 8) said, "…the IT profession is challenged with meeting the demand to enlarge the IT workforce by recruiting and retaining personnel from historically underrepresented groups." This chapter looks at women in IT, shedding light on one historically underrepresented group.

BACKGROUND

Previous literature on women in IT has focused on education and the IT workforce. More recent research pursuits have focused on feminism as a lens through which to view gender and IT. The following sections discuss these areas.

Primary and Secondary Education

To increase the pipeline of women pursuing IT-related majors in universities, we must reach girls at a young age. Many factors, both structural and social, influence career choices of both genders, as seen in Adya & Kaiser's (2005) model. Generally speaking, social influences come from role models and influences by family members, peers, and the media; whereas structural influences are found in the support provided by educational institutions. One ubiquitous and early influence on a young girl's perceptions of computers comes through the mass media and its gendered implications, as reported by Gannon (2007). For example, magazines that appeal to teenage girls, including those with global editions for other cultures, consistently fail to portray women in professional careers using technology (Adya & Kaiser, 2005), but, rather, focus on beauty, fashion, and relationship items. Even as young women expand their readings and increase their exposure to home computing magazines, they will find images of women as novices when dealing with technology, in contrast to technologically competent and powerful males (Johnson & Lynch, 2006).

Although there has been little advice regarding how to counteract the media influences, researchers have made multiple suggestions on how to modify structural influences, one of which is the use of single-sex schools. However, a recent study showed that girls in single-sex schools did no better than their counterparts in coeducation schools in deciding to major in CS (Olivieri, 2005). Olivieri proposes that the lack of computer knowledge and understanding are more common reasons that girls do not choose to major in CS rather than the presence of mostly men in IT courses.

Some researchers have advocated exposing girls to programming as early as possible to increase their comfort and skill in developing simple programs on their own, be-

lieving this exposure will give girls an edge when they take the first programming course in college. However, Katz, Allbritton, Aronis, Wilson & Soffa (2006) note that girls who develop programming skills in high school may do so at the expense of advanced math skills. Clearly, that outcome is not satisfactory since math skills are highly correlated with success in CS.

Post-Secondary Education

Student perceptions of IT are "moderately gendered with a greater emphasis on masculine traits and abilities" (Joshi & Schmidt, 2006, p. 38). Students pursuing university degrees often do not understand IT-related fields and the diversity of career opportunities available. In fact, when college students are asked to draw a computer scientist, they usually draw a geeky, smart person, often with glasses, eating junk food and invariably male (Martin, 2004). Moreover, stereotypes associated with CS tend to be associated with IT in general, at least until undergraduate students are exposed to IT careers in introductory college courses. At that time, students begin to see the diversity in IT and how CS is uniquely different from IS (Joshi & Schmidt, 2006).

Most studies show that there are few significant differences for the variables of gender, persistence in IT-related courses, and achievement (Ilias & Kordaki, 2006). However, Katz, et al. (2006) showed that men who earned a grade below "B" in an early CS course were more likely to persist in CS than were their female counterparts. Perhaps average performing males have higher levels of self-confidence and believe they can succeed in subsequent courses as compared to their female colleagues. Interestingly, Ilias & Kordaki (2006) found that female graduate computer engineering students in Greece completed their studies faster than their male counterparts.

Researchers have recommended that university professors use care when integrating group projects and online learning tools into the classroom. Wolfe & Alexander (2005) showed that when coeducational project teams form, a single male often emerges as the resident computer expert. Then women do not learn how to effectively use technology tools, and men receive great credit for being the technical expert, thus perpetuating the myth of the masculine-dominated IT field. Moreover, when professors use technology tools in male-female classes, they should ensure that online tools allow equal participation by all students (Huynh & Schuldt, 2005).

Research has also shown that another factor affecting the retention of IT students is the type of assignments given in CS classes. For example, female students prefer to work on real-world applications, while males prefer to work on game problems. Yet, current textbooks continue to provide a large percentage of math problems (Wilson, 2006).

The IT Workforce

For those females who successfully persist to complete an IT degree, other challenges await them in the professional world. One of the major issues affecting women's job satisfaction is work-family life balance (Gallivan, 2004). Most women realize that IT careers require them to constantly re-train and learn new technologies. Much of the dissatisfaction with work-family life balance may be explained in how companies approach professional development opportunities. For example, in a company that paid for employees to undertake training on company time, women had lower levels of stress, as compared to women at a company that expected employees to undertake professional development on their own time (Gallivan, 2004). Since women are typically the primary caregivers for children and older parents, the work-family life balance issue may be more important to them than their male counterparts.

Another important issue related to work-family life balance is flexibility in scheduling. Armstrong, Riemenschneider, Allen & Reid (2007) found that women were concerned about the lack of consistency and equality in corporate policies regarding flexible work schedules. As the primary caregivers, women may need more flexible scheduling options than their male counterparts. As Tapia (2006, p. 94) notes, companies should develop organizational policies that are "sensitive, especially with regard to training and professional career development of a diverse IT staff."

Ironically, while medium and large corporations may not have been able to accommodate the work-family life balance requirements of women, women entrepreneurs have excelled in using IT to set up their own companies, thereby customizing how technology can help balance home and work needs. Computers and the Internet have enabled female small business owners to become independent and highly effective in developing new ways to meet market demands (Martin & Wright, 2005). Clearly the passive and novice role of women with respect to computers as portrayed in computer advertisements (Johnson, Rowna & Lynch, 2006) is not indicative of reality.

Global Issues

For issues related to IT education and the IT workforce, research needs to include a global perspective. There may be differences in groups not because of gender, but because of culture (Sagi, Carayannis, Dasgupta, & Thomas, 2004). When attempting to fill the pipeline and ultimately populate the IT workforce with women and other underrepresented groups, careful consideration of cultural and local contexts must be understood for successful development of interventions.

For example, the NetCorps Jordan Project, an IT training project in Jordan, found that culture, context, and gender