Female Retention in Post-Secondary IT Education

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INTRODUCTION

The historical gender stratification in technical disciplines has been an area of study for many years and researchers have concluded that women are alarmingly under-enrolled in post-secondary information technology (IT) education (e.g., Camp, 1997; Teague, 2002; von Hellens, Nielsen, Greenhill, & Pringle, 1997). One challenge facing the IT gender gap discourse is the application of theories that focus on a variety of levels of analysis (Korpela, Mursu, & Soriyan, 2001; Walsham, 2000). Recently, the Individual Differences Theory of Gender and IT has been proposed by Trauth (Trauth, 2002; Trauth, Huang, Morgan, Quesenberry, & Yeo, 2006; Trauth & Quesenberry, 2006, 2005; Trauth, Quesenberry, & Morgan, 2004) to explain the underrepresentation of women in the IT workforce at both the societal *and* individual levels of analysis. To date, the majority of the Individual Differences Theory of Gender and IT research has focused on improving our understanding of the underrepresentation of women in the IT workforce.[1] Hence, in an attempt to build on the theoretical foundation, this article reports on a literature survey of the influences on American women's retention in post-secondary IT education.

BACKGROUND

Walsham (2000) stresses the importance of research agendas that help to improve the understanding of IT in the contemporary world. Hence, researchers should investigate IT that enables connectivity, but supports diversity by studying particular levels of analysis in detail and context including: the individual, group, organization, inter-organization, and society levels. Korpela et. al. (2001) also support the level of analysis concept by constructing a 2x4 + History framework, which contains four integrative levels of analysis: the individual, group/activity, organizational, and societal levels.

The Individual Differences Theory of Gender and IT articulated by Trauth (Trauth, 2002; Trauth & Quesenberry, 2006, 2005; Trauth et al., 2004, 2006) answers the call for research at multiple levels of analysis stressed by Walsham (2000) and Korpela et al. (2001). First, the theory focuses on women as individuals, having distinct personalities, experiencing a range of socio-cultural influences, and thus exhibiting a range of responses to the social construction of IT. As a result, the theory focuses on an individual level of analysis while acknowledging gender group and societal influences. Secondly, the Individual Differences Theory of Gender and IT takes into account the role of gender group and societal shaping and the importance of individual critical life events (Trauth, 2002; Trauth & Quesenberry, 2005, 2006; Trauth et al., 2004, 2005a).

This theory accounts for the differences among women in the ways they experience and respond to the IT workforce using three constructs: personal data, shaping, and influencing factors and environmental context (Trauth et al., 2004). The personal data construct includes: demographic data (e.g., age, race, and ethnicity), lifestyle data (e.g., socio-economic class and parenting status), and workplace data (e.g., job title and technical level). The shaping and influencing factors construct includes: personal characteristics (e.g., educational background, personality traits, and abilities), and personal influences (e.g., mentors, role models, experiences with computing, and other significant life experiences). The environmental context construct includes: cultural attitudes and values (e.g., attitudes about IT and/or women), geographic data (about the location of work), and economic and policy data (about the region in which a woman works).

MAIN THRUST OF THE ARTICLE

A literature survey of gender and IT research was conducted to understand how individual attributes contribute to the retention of females in post-secondary IT education in support of the Individual Differences Theory of Gender and IT (Trauth, 2002; Trauth & Quesenberry, 2005, 2006; Trauth et al., 2004, 2006). This analysis resulted in the identification of several research themes that influence women in IT education. These themes include: personal attributes, learning experiences, and responses to support structures and will be discussed in more detail in the remainder of this section.

Personal Attributes of Students

Researchers have found that self-confidence has a large influence on female retention in post-secondary education (Alper, 1993; Ambrose, Lazarus & Nair, 1998; Beckwith, Burnett, Wiedenbeck, Cook, Sorte, & Hastings, 2005; Vest & Kemp, 1999). Shashaani (1994) argues that there is a direct connection between informal computing experiences and high levels of self-confidence in using and understanding IT. This notion is articulated by Margolis and Fisher (2002) in their argument that men tend to have more informal computing experiences than women at the post-secondary level. As a result, male students generally have higher levels of computing self-confidence than female students. Over time, this causes female students to question their technical knowledge and personal fit with an IT related degree, eventually leading to lower female retention numbers.

Research has also demonstrated that negative images of the IT workforce have an influence on the retention of women in post-secondary IT education (Ahuja, Robinson, Herring, & Ogan, 2004; Balcita, Carver & Soffa, 2002; Camp, 1997; Nielsen, von Hellens & Wong, 2000; Vest & Kemp, 1999). Joshi, Schmidt, and Kuhn (2003) and Camp (1997) explain that both men and women acknowledge the negative stereotypes of IT work (e.g., IT work is solitary and a male domain). Furthermore, these stereotypes persist despite receiving accurate information about IT careers (Joshi et al., 2003). Balcita et al. (2002)

argues that these negative stereotypes are shaped by the media, and society, which frequently present the IT domain as a place that does not welcome feminine characteristics or traits. For instance, television shows such as *Bill Nye the Science Guy* and *Mr. Wizard* demonstrate strong male presence in science, but lack female role models with whom women can identify. As a result, women, more than men, leave post-secondary IT education programs because they cannot imagine their roles within the field.

Student Learning Experiences

Barker, Garvin-Doxas, and Jackson (2002) and Katz, Aronis, Allbritton, Wilson, and Soffa (2003) argue that experiences in learning environments also have an influence (positive and negative) on female retention in post-secondary IT education.[2] These authors found that the influences of impersonal environment and guarded behavior, informal student hierarchy, and the creation of a defensive social climate are the most important factors in student retention. For instance, Barker et al. (2002) observed that technical courses in post-secondary IT education have the tendency to be impersonal social environments in which it is easy for students to remain relatively anonymous and socially distant. The authors found that it was rare to hear the names of students or the sharing of personal information among students and professors in technical classes. Students in these technical courses were typically referred to as "the woman in the red shirt" or by desk location such as "F1." In addition, informal hierarchies were created by the attainment and display of status in social structure of the classroom. In these technical courses, status was afforded to those students who displayed the highest level of technical skills. Students with programming experience were frequently referred to as "smart" and it was implied that they had intellectual superiority over the other students. Eventually, students became aware of whether they belonged in the group and their places in the social hierarchy. Unfortunately, the female students felt as outsiders and did not share social hierarchy with their male counterparts.

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