A Model to Explore IT Career Barriers for Girls/Women

Donna M. Grant, DePaul University, 243 South Wabash Avenue, Chicago, IL 60604, USA; E-mail: dgrant@cti.depaul.edu

Linda V. Knight, DePaul University, 243 South Wabash Avenue, Chicago, IL 60604, USA; E-mail: lknight@cti.depaul.edu

ABSTRACT

Previous researchers have cited a number of plausible explanations for the under-representation of women in the Information Technology (IT) field. However, there has not been a comprehensive study of the barriers women face in this field or the facilitators that encourage them toward IT, and the studies we have do not provide a cohesive picture of the situation as a whole. The primary reason for this deficiency is the broad nature of the problem. Studying such a wide-reaching problem requires careful, guided segmentation into manageable and logically cohesive slices. Toward this end, this research proposes a model of the IT Career Lifecycle that can be used both to categorize the work of prior researchers and to design future studies.

INTRODUCTION

Over the past two decades, numerous researchers have reported on the diminishing number of women interested in IT careers. In this research, IT is defined as the broad subject concerned with all aspects of accessing, managing, processing, and transmitting information, especially within a large organization or company (Webopedia, 2006). IT careers consist of occupations that require designing, developing, and implementing software and hardware systems, providing technical support for software and hardware systems, and creating and maintaining network or database systems (Creamer et. al, 2004). Camp (1997) in her classic article, *The Incredible Shrinking Pipeline,* emphasizes, "The ratio of women involved in computer science from high to graduate school has been dwindling at a startling pace over the past decade" (p.129). Sanders (2005) states that with the growing role of technology in the world at the beginning of the 21st century – in education, communications, occupations, and entertainment, and as a tool for solving the world's problems – American women's low and decreasing representation is a major concern. Furthermore, the percentage of women receiving bachelor's degrees in the Science, Technology, Engineering, and Mathematics (STEM) disciplines in the United States has increased in every category except Technology (National Center for Educational Statistics, 2005). From 1984 to 2004, the percentages of women receiving bachelor's degrees in the Physical Sciences ranged from 27.6% to 41.7%, Biological/Biomedical Sciences from 46.7% to 62.2%, Engineering from 14.1% to 20.5% and Mathematics from 44.3% to 46.0%. Technology started strong in 1984 with 37.1% women receiving bachelor's degrees; however, 2004 brought a dismal decrease to a low of 25.1%, near the level of three decades ago. The proliferation of computers and information technology in our society, businesses, schools, and homes would have suggested an increase in the participation of women in technology bachelor's degrees, but instead we are faced with a state of clear and continuing decline.

IT CAREER LIFECYCLE MODEL

Carlson (2006) reports that women who want to pursue a career in IT face barriers as early as grade school, in high school, through college and into the work world. Ahuja (1995) developed a model that depicted the factors that constrained women throughout multiple aspects of their recruitment and advancement in the IT field. Ahuja grouped factors influencing women's professional IT career choice into three stages: 1) Early Educational 2) Career Choices and 3) Career Advancement. In Stage I, Early Educational, Ahuja referred to positive and negative experiences that may have influenced a child's attitude and perception toward computers. Stage II, Career Choices, consisted of factors that influenced the critical career choices women made during their university education experience and initial entry into the job market. Finally, in Stage III, Career Advancement Stage, Ahuja considered factors that impede promotions to higher-level IT careers.

Ahuja's model, put forth over ten years ago, is updated by the model proposed here. This new model recognizes that young women begin to make their career choices before Stage II, and it distinguishes more clearly between the university experience and entry into the IT field. In addition, it includes career retention along with career advancement. The new model, proposed here, is shown in Table 1. This model, entitled IT Career Lifecycle, expands Ahuja's three stages into four: 1) Stage I - Contemplating choice of IT major, 2) Stage II - Validate or redefine IT major, 3) Stage III - Initial entry into IT field, and 4) Stage IV - Retention and advancement in IT field.

Table 1. IT career lifecycle model

	Stage	Description	General Timeframe	Selected Researchers	
	I	Contemplating a decision of IT major	Early Childhood to juniors and seniors in high school	AAUW report (2000), Bleeker (2006), Jepson and Perl (2002)	
	II	Validate or redefine IT major	College	Cuny and Aspray (2000), Pearl et al. (1990), Margolis & Fisher (2002)	
	III	Initial entry into IT field	One to three years in IT profession	Teague (2000)	
	IV	Retention or advancement in IT field	Three or more years in IT profession	Trauth (2006)	

The arrows in the new IT Career Lifecycle (See Table 1) represent the ability for women to enter or exit the model at any stage. The entry arrows illustrate potential barriers in recruitment of women in each of the four stages of the model, whereas the exit arrows illustrate potential barriers in retention. As the model indicates, a female high school student could decide to major in IT in Stage I of the IT Career Lifecycle Model, and leave the IT field during college in Stage II, due to the long hours in the computer lab and the perception of not having enough time to have a life outside of school. On the other hand, a woman could major in another discipline and enter into the IT Career Lifecycle in Stage III, as a self-taught IT professional. This same woman could leave her IT career in Stage IV due to a lack of opportunities for advancement. Thus, the IT Career Lifecycle model facilitates the ability for the IT community to concentrate and focus their research in a specific stage where girls/women may encounter barriers in their IT careers and target their intervention recommendations in either recruitment strategies, retention strategies, or both.

RELATING KEY STUDIES TO THE MODEL

Stage I consists of barriers a young girl may encounter from her early childhood years to the later years of her high school experiences. The American Association of University Women Educational Foundation report (2000) explains that many girls have a concern with the computer culture and express a "we can, but I don't want to attitude toward computer technology" (p.7). Jepson and Perl (2002) surveyed 652 high school students. Their study revealed several reasons why girls did not choose IT careers: not enough role models in the IT field, other interests, lack of knowledge of the industry, limited opportunity or access to computers, and the image of IT people as nerdy. Bleeker's (2006) study of 460 high school students concluded that the boys surveyed reported a significantly higher expected level of success and interest in IT jobs than the girls. The barriers that create this IT disinterest for girls must be examined to obliterate pipeline leakage in the beginning of the career lifecycle.

In Stage II, a young woman who has decided to major in an IT discipline may encounter barriers while she is validating her major during her college experience. Pearl et al. (1990) focused on the shrinkage of women in the IT pipeline from the pre-college level through graduate school; however, their primary focus was at the college level. Pearl et al. determined three primary barriers for women attempting to enter the field: "difficulties with self-esteem, lack of role models and gender discrimination." Cuny and Aspray (2000) reported on a workshop that developed 20 intervention strategies to increase women's participation in IT graduate programs across the United States. Margolis and Fisher (2002) conducted a study at Carnegie Mellon to investigate computer science education and the experiences of computer science students at the university level. As a result of their research, Margolis and Fisher discovered various differences in computer career decisions, interests, attitudes, and experiences of men and women at Carnegie Mellon. The goal of their research was to understand the differences and develop strategies to increase the participation and retention of women in IT.

Stage III barriers could restrict a young woman's growth and development of her IT career during her initial years in the IT industry. During Stage IV, an experienced IT professional woman may encounter barriers in the industry that impede her opportunity to advance her career. Trauth conducts research on women in the information technology workforce. Teague (2000) studied 15 IT women professionals to explore their reasons for entering the IT industry, what they liked about the industry, and what they didn't like. Some of the explanations for disliking the computer field were being in a male-dominated environment, lack of mentors, and discrimination in salaries. Trauth's research (2006a) examines the "Individual Differences Theory of Gender and IT." This Individual Differ-

ences Theory depicts the variation of how IT professional women from different backgrounds perceive and respond to the IT environment, computing culture and societal influences. Moreover, Trauth's contribution as Editor-in-Chief of the Encyclopedia of Gender and Information Technology is an international compilation of over 200 articles highlighting the emerging research and trends on men and women in IT (Trauth, 2006b).

CONTRIBUTIONS AND FUTURE USES OF THE MODEL

By breaking the broad area of women's under-representation in the IT field into more easily studied stages, this model provides both a way of categorizing, relating, and identifying gaps in prior work, as well as guidance for future research.

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