Gender Differences in Education and Training in the IT Workforce

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INTRODUCTION

Historically, women have had lower levels of educational attainment (Freeman, 2004; NCES, 1999), which in turn could negatively affect their opportunities in the labor market. However, in the past decade, this has changed dramatically. In general, more women have completed college, and more women have received bachelor's and master's degrees than men. Only in the highest level of education (PhD), men hold more degrees than women (NCES, 1999, 2002). In a recent study by the National Center for Education Statistics (NCES), Freeman (2004) presents an overview of the latest developments with regard to gender differences in educational attainment. Historically, females have tended to account for the majority of bachelor's degrees in fields that often lead to lower paying occupations, such as education and health professions, while males have typically predominated in higher paying fields, such as computer science and engineering. While some of these disparities persist, many changes have occurred since the 1970s. Certain fields in which men received the majority of degrees in the 1970s, such as social sciences, history, psychology, biological sciences/life sciences, and business management and administrative services, attained relative gender parity or were disproportionately female by 2001. While other fields, such as computer and information sciences, physical sciences and science technologies, and engineering, continue to have a larger proportion of males, the percentages of females majoring in those fields is increasing (Freeman, 2004). Between 1970 and 2001, the percentages of master's, doctoral and first-professional degrees earned by females increased substantially in many fields. However, advanced degrees conferred still tend to follow traditional patterns, with women accounting for the majority of master's and doctor's degree recipients in education and health, and men accounting for the majority of recipients in computer and information sciences and engineering. Higher levels of educational attainment are associated with certain labor market outcomes, such as higher labor force participation rates, higher rates of employment, and higher earnings (Freeman, 2004). A study by Igbaria, Parasuraman and Greenhaus (1997) looked at gender differences in the *information technology (IT) work force* with regard to education and experience, career history and attainments and career orientation. The results showed significant differences in educational attainment. A larger percentage of female IT employees in the study ended their formal education after attaining a bachelor's degree.

BACKGROUND

IT companies face many dilemmas when hiring new employees. Among these dilemmas are which recruits are qualified hires and how to ensure that their current IT employees amass critical skills needed for the company to stay competitive (Schwarzkopf, Mejias, Jasperson, Saunder, & Gruenwald, 2004). To answer this dilemma, many companies look for employees that have a formal post-secondary edu-

cational background in a technical field. The U.S. Department of Commerce (2003) has found that a four-year technical degree helps IT professionals get their foot in the door and get promoted. This is further emphasized in the projection from the Bureau of Labor Statistics (BLS) that between 2000 and 2010 almost 75% of the job openings within the IT professional level will require a minimum of a bachelor's degree (U.S. Department of Commerce, 2003). The IT training landscape is diverse, complete with traditional four-year university degree programs in computer science to newer training models, such as IT vendor-related training and certification programs and online learning (U.S. Department of Commerce, 2003). This vast array of education and training options provides a multitude of knowledge and skill sets that IT employees may enjoy. However, with such a diversity of IT training and educational pathways, it quickly becomes apparent that there is no "one-size fits all" approach to training for companies to take (U.S. Department of Commerce, 2003). Thus, IT companies are faced with the following challenge: how to keep pace with technological changes that have short life cycles (U.S. Department of Commerce, 2003). This challenge to keep pace with the ever-changing technology is felt by IT employees within companies as well. Stress has been recognized as a key factor affecting IT productivity and turnover, and can increase the costs that companies endure (Sethi, King, & Quick, 2004). It is essential for IT employers to examine the factors that contribute to their employees' stress. There are two stressors associated with training: one involves the need for appropriate training and the other involves the development of skills to complete tasks (Sethi, King, & Quick, 2004).

MAIN THRUST OF THE ARTICLE

The data analyzed in this article comes from the database of the project on "*Paths to Retention and Turnover in the IT Workforce: Understanding the Relationships between Gender, Minority Status, Job and Organizational Factors*" (http// cqpi2.engr.wisc.edu/itwf/index.html). Participants within the selected companies were identified based on two characteristics: (1) their job was within the

information technology workforce, and (2) they have worked in their current job for two months or more. The data collection tool used is a 139-item Web-based questionnaire (Carayon, Schoepke, Hoonakker, Haims, & Brunette, 2005, in press).

Sample

The sample consists of five companies of varying size. Company 1 is a medium-sized Midwestern IT firm with 190 professionals. Company 2 is an eastern health care provider network with 895 IT professionals. Company 3 is a small western IT firm with 11 IT professionals. Companies 4 and 5 are both small eastern IT firms with 9 and 11 IT professionals respectively. Since the large company is not an IT company per se, the sample exemplifies the literature that 92% of IT professionals work in non-IT companies (ITAA, 2002). The total sample size is 624 with 46% women and 54% men (27 respondents did not report their gender). The average age is 40 years, with women being significantly older than men (t-test; $p<0.05$). Marital status (e.g., living with someone vs. not) is significantly different between women and men (χ^2 test; $p<0.05$): 65% of the women live with a spouse/partner, compared with 73% of the men. Parental status is not significantly different between women and men.

Measures

The items on training received were adapted from Lehto & Sutela (1999). To measure satisfaction with training opportunities, we developed our own scale, based on in-depth interviews we conducted in the pilot study (Carayon, Brunette, Schwarz, Hoonakker, & Haims, 2003). Respondents are asked whether they strongly disagree, disagree, agree, or strongly agree with statements such as: "I receive ongoing training which enables me to do my job better" (see Figure 1). Cronbach's alpha for the scale of satisfaction with training opportunities is 0.93. To measure quality of working life (QWL) we used existing scales that were found to be valid and reliable in previous research. Our own analysis has confirmed the validity and reliability of the scales used (Carayon et al, 2005, in press). All scales we used in the questionnaire were converted to scores from 0 (lowest) to 100 (highest). The following QWL fac-

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