Gender and the Culture of Computing in Applied IT Education

Susan C. Herring
Indiana University, USA

Christine Ogan
Indiana University, USA

Manju Ahuja
Indiana University, USA

Jean C. Robinson
Indiana University, USA

INTRODUCTION

The "shrinking pipeline" of women who ascend through the ranks in computer science education programs and careers is by now a familiar problem. Women drop out at rates faster than men at all levels of educational and professional advancement, resulting in a gender gap especially pronounced at the highest levels of the computing workforce, and that has not narrowed appreciably at any level in more than 20 years (Camp, 1997; ITAA, 2005; Vegso, 2005). Efforts to move more women into the pipeline at lower levels have met with limited success (cf. the Carnegie Mellon experience as reported by Margolis & Fisher, 2002); girls and women still express less interest than boys and men in studying computer science and pursuing information technology (IT) careers (Bentson, 2000; Vegso, 2005).

A reason often cited in the literature is the masculine culture of many computer science programs and IT workplaces, which is perceived by many women as alien and unwelcoming (Bentson, 2000; Spertus, 1991; Turkle, 1988). Even when institutions make efforts to treat women and men equally or accord women special consideration in admissions and hiring decisions, attitudes discouraging women from entering computing persist, both within the institutions and in society at large. Sometimes these attitudes are expressed overtly: Underground "hacker" culture is notoriously antagonistic to women (Gilboa, 1996), and even mainstream computer aficionados respond with resistance and sexist jokes to proposals to recruit more girls and women to study computer science (Slashdot.org, 2005). Moreover, there is a widespread perception that computer experts are socially-isolated "geeks" or "nerds" obsessed with technology, a mode of being that women, who tend to be more socially oriented, find unappealing (Margolis & Fisher, 2002; Turkle, 1988).

Fortunately, the situation for computer science does not tell the whole story. In the latter part of the 20th century, the expansion of computing and the Internet fueled the rise of applied IT fields in which technical skills, rather than being developed for their own sake, are increasingly put to use in the service of human needs. Applied fields, such as information science, information systems and instructional technology, have gained strength, and a new interdisciplinary field, informatics, has emerged. At the same time, interest in computer science itself is declining, especially among women (ITAA, 2005; Vegso, 2005). In this article, we explore the possibility that applied IT fields may provide more women-friendly cultures while still focused on technology. The larger question underlying this exploration is: Does applied IT education have the potential to bridge the "gender computing gap"?

BACKGROUND

Previous research has focused primarily on problems faced by women in computer science, espe-

cially in undergraduate-level education (Camp, 1997; Cohoon, 2001; Spertus, 1991). Many influences have been cited as contributing to the educational gender gap in computer science, including aspects of institutional culture, such as lack of role models (Pearl, Pollack, Riskin, Thomas, Wolf, & Wu, 1990), mentoring and advising (Whitely, Dougherty, & Dreher, 1991), informal networking (Smith-Lovin & McPherson, 1993) and a sense of belonging and identity (Ely, 1995); work-family conflict (Netemeyer, Boles, & McMurrian, 1996); and teaching styles (Cohoon, 2001; Turkle, 1988).

One of the most often-cited factors that discourage girls and women from studying computer science is the culture of computing itself: Computing is historically and conventionally associated with masculinity, an association that attracts boys to computers who then become role models for other boys, creating environments in which girls feel marginalized (Hacker, 1990; Turkle, 1988). Citing Margolis and Fisher (2002), Read (2002) argues that "women are further alienated by a stifling 'geek culture' that celebrates obsessive computing at the expense of broad interests." Hackers are perceived as keeping exceptionally long hours and late nights, and manifesting "highly focused, almost obsessive behavior" (Frenkel, 1990, p. 38). For many women, this work ethic conflicts with their desire to start a family or, if they are older, their actual family responsibilities. Meanwhile, hackers, who are predominantly male, are seen as being "bright and creative," while women remain on the periphery. Rasmussen and Hapnes (1991) suggest that this type of culture is important in producing and reproducing male domination in higher education in computer-related fields and that it influences the integration of women and their position within the field of computing.

The abstractness of much computer science instruction exacerbates the gender-biased culture, in that girls are more likely to be interested in real-world problem solving in contexts involving human users than in machines and programming languages (Clarke, 1992). A related deterrent for women is that most introductory computer science courses focus on programming skills rather than concepts of computer science. Girls and women like IT, the findings suggest, but want to do something with it to improve the world; they are not satisfied with mastering computing skills for their own sake.

Applied fields such as information science, information systems and instructional technology have an a priori advantage over computer science when it comes to attracting future female professionals. They are grounded in the disciplines of real-world problems; for example, business, education and information management. Indeed, while women are significantly underrepresented in the IT workforce overall (ITAA, 2005), especially in computer science (Bryant & Vardi, 2002), applied careers, such as education and library and information science, attract higher proportions of women (e.g., Maata, 2003). However, research on the status of women in these professions shows mixed outcomes. On the one hand, women in applied disciplines are more likely to achieve professional parity or near parity with men (Quint, 1999; Wolverton, 1999). On the other hand, even in female-predominant applied professions such as education and library science, most high-ranking administrators are men (Growe & Montgomery, 2000; McDermott, 1998). Moreover, men tend to be disproportionately represented in IT work in these fields, which also tends to be more highly paid and more prestigious (e.g., Harris, 2000 for library and information science).

Little has been written about what leads women (or men) to choose applied IT careers, or what kinds of disciplinary cultures they encounter when they decide to study an applied IT domain. That is, there is no body of literature directly comparable to that available for computer science on which to base predictions about the long-term effects of the growth of applied IT fields on the gender computing gap. To address this research gap, we initiated the Information Technology Workforce (ITWF) project.

INFORMATION TECHNOLOGY WORKFORCE PROJECT

The ITWF project, funded by the National Science Foundation,[1] has been collecting and analyzing data on the experiences, attitudes and outcomes of women and men in IT programs at five large public universities in the United States (U.S.)[2] since September 2003. The focus is on students at all levels majoring in applied IT disciplines, specifically: information systems (IS), instructional systems technology (IST), informatics (I) and library and information science/

Related Content

Empower Gender Diversity with Agile Software Development
Orit Hazzanand Yael Dubinsky (2006). *Encyclopedia of Gender and Information Technology (pp. 249-256).*
www.irma-international.org/chapter/empower-gender-diversity-agile-software/12744

"For me it doesn't matter where I put my information": Enactments of Agency, Mutual Learning, and Gender in IT Design
Johanna Sefyrin (2010). *Gender Issues in Learning and Working with Information Technology: Social Constructs and Cultural Contexts (pp. 65-82).*
www.irma-international.org/chapter/doesn-matter-put-information/42489

Boards Need Women with IT
Sonja Bernhardt (2006). *Encyclopedia of Gender and Information Technology (pp. 70-76).*
www.irma-international.org/chapter/boards-need-women/12717

Pushing and Pulling Women into Technology-Plus Jobs
Chris Mathieu (2006). *Encyclopedia of Gender and Information Technology (pp. 1035-1040).*
www.irma-international.org/chapter/pushing-pulling-women-into-technology/12868

Gender in Distance Education Technology
Colette Wanless-Sobel (2006). *Encyclopedia of Gender and Information Technology (pp. 622-629).*
www.irma-international.org/chapter/gender-distance-education-technology/12801