The Girls’ Computing Club: Making Positive Changes in Gender Inequity in Computer Science with an Informal, Female Learning Community

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ABSTRACT

This research was designed to increase the awareness of female students with regard to Computer Science (CS) as both a major and a career field. Five female students from a high school in a northeastern state were voluntarily recruited for a weekly, after-school computing club curriculum for one academic year. Over the project period, participants ventured through tasks relating to various technologies, thereby increasing their computer confidence. Collaboration preferences increased only when faced with both technical and content knowledge. Participants’ understanding of CS changed from abstract and superficial to more concrete, but disinterest in the major persisted. Finally, while the participants’ perceptions of gender differences changed, some of the self-reflections did not match their responses to structured questions. While the project impacted only a small sample, increased knowledge of the field of CS prevailed. If females are educated earlier, this may cause a noticeable shift in gender inequity amongst CS majors.

Keywords: Collaborative Learning, Computer Science, Gender Bias, Gender Equity, Girls, High School Students

INTRODUCTION

Today’s high school students, often called the Net Generation or Digital Natives, are quite accustomed to computers, the Internet, and other digital devices (Hebert & Chen, 2005). In fact, 93% of all Americans between 12 and 17 years old use the Internet and 89% of online teens use the Internet at least once a week (Pew Internet & American Life Project, 2007). They are not only the content consumers but also content generators (Educause Center for Applied Research, 2006) and enjoy the use of computers for both leisure and academic experiences. It is clear that these students are more computer-conscious and confident than any other generation in modern history.

Female students use a wide range of digital devices on a daily basis just like male students (Christie, 2005). For the last 20 years, however, there has persisted a noticeable gap in computer use among females in comparison with males (Jensen, De Castell, & Bryson, 2003), in the number of female students pursuing Computer
Science (CS) majors and in the retention ratio within the major. The gender gap in CS majors is even wider than before, with a 93% decrease in females since 1982 (Vesgo, 2005). It was reported that females drop out, even though they have higher grade-point averages than their male counterparts in CS majors (McDonald, Dorn, & McDonald, 2004). Females are the minority with regard to gender ratios in computing.

LITERATURE REVIEW

The United States Labor Department has projected that graduates of computing related majors will have strong job prospects (Vesgo, 2006). Unfortunately, the Information Technology (IT) workforce has been in shortage of qualified personnel, and the diminishing workforce problem is expected to be even more serious in the coming decade (Kamal, 2005; Peckham et al., 2007). Researchers have remarked that if we attract more female students to computing disciplines and sustain their interests in the IT industry, the problem of the IT workforce shortage could be resolved to a certain degree (Katz, Allbritton, Aronis, Wilson, & Soffa, 2006) since females represent over 50% of the higher education student population (Peckham et al., 2007).

There have been, thus, numerous research efforts to identify causes of the low female presence in CS as well as related solutions. Among the identified factors, lack of computer experience (Varma, 2002), negative perceptions of CS (Forte & Gudial, 2005), male dominant CS culture (Margolis & Fisher, 2002), lack of female mentors and role models (Byrne & Lyons, 2001), and lack of knowledge and understanding of CS (Jepson & Perk, 2002) are often referenced by researchers.

Lack of Computer Experience

While some researchers argue that prior computing experience has no relationship to success in CS (Cohoon, McGrath, & Aspray, 2006), there has been a great deal of documented evidence of female students’ lack of computer experience compared to male students when entering college (Teague, 2000). With comparably less female oriented software and games, females gain less experience with computers in their early years, and it is believed to prevent females from choosing CS majors (Tsagala & Kordaki, 2007). Providing computer experiences with weekly activities as well as personal and group work could change the female students’ computer use, especially in the quality of computer use, and this could alter their perceptions of the computer (Countryman, Feldman, Kekelis, & Spertus, 2002).

Negative Perception of CS

Even though many aspects of CS require a great deal of interactions with people, CS is still perceived as boring, asocial, lacking creativity, and tedious (Yardi & Bruckman, 2007). Since the media has great influence in females’ choices (Tsagala & Kordaki, 2007), it has also contributed significantly to this negative perception (Lazowska, 2002). Females prefer social interactions and the belief that CS is a major that is socially isolated may be a reason that discourages their pursuit thereof. Ample exposure to the fun side of computing with multimedia and collaborative WYSIWYG (What you see is what you get) activities could change the female students’ perception of CS such as boring and asocial.

Male Dominant CS Culture

Female students are often surrounded by stereotypes that assert that CS is male dominated (Bhargava et al., 1999) and, thus, they feel less secure in their pursuit of and propensity for success within CS. According to a study by Schofield in 1995, as cited in Jensen et al. (2003), advancing in CS and computer related skills (e.g. gaming, programming) were seen as masculine characteristics that are honed from childhood (Countryman et al., 2002); thus, female students who excelled were ridiculed about their femininity. In addition, even if they
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