

## Chapter 5.4

# Girls and Computers – Yes We Can!

### A Case Study on Improving Female Computer Confidence and Decreasing 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 computer 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.*

DOI: 10.4018/978-1-61350-456-7.ch5.4

## 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, 63% of online teens use the Internet every day, 73% of online teens use social networking websites, 75% of teens own a cell phone; 79% own an mp3 player, and 80% own a gaming device (Lenhart, Purcell, Smith, & Zickuhr, 2010). 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). Despite the progress made in the field of computing over the past decade, such as women playing a heightened role in technology leadership and gaining representation in organizational hierarchies, women are still underrepresented amongst Computer Science (CS) faculty in four-year US institutions. The proportion of women in leadership positions in the technology-industry is quite low; the salaries of women with CS degrees is still lower than their male counterparts; the proportion of women employed in CS occupations has declined; and the proportion of women receiving CS undergraduate degrees has sharply declined over the past 20 years (Klawe, Whitney, & Simard, 2009). 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 even though females have higher grade-point averages than their male counterparts in CS majors, they are still less likely to complete the CS degree (McDonald, Dorn, & McDonald, 2004). Females are still the minority with regard to gender ratios in computing.

## LITERATURE REVIEW

The Bureau of Labor Statistics has reported that from 2008 to 2018, employment of computer software engineers and computer programmers is projected to increase by 21 percent; employment of computer and information systems managers is expected to grow 17 percent; employment of computer systems analysts is expected to improve by 20 percent; and employment of computer scientists is expected to yield a 24 percent increase. All of these indicate a much faster growth rate than the average for all non-computing related occupations (Bureau of Labor Statistics, 2009). The United States Labor Department has also projected that graduates of computer related majors will have strong job prospects (Vesgo, 2006). Unfortunately, the Information Technology (IT) workforce has had a shortage of qualified personnel, and the diminishing workforce problem is expected to be even more serious in the coming decade (Kamal, 2005; Nagesh, 2009; Opsahl, 2008; Peckham et al., 2007; Teitelbaum, 2006). 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; Panko, 2008) 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 referenced by researchers, lack of computer-related experience (Carter, 2006; Varma, 2002), negative perceptions of CS (Cassel, McGettrick, Guzdial, & Roberts, 2007; Forte & Gudial, 2005), male dominated CS culture (Cheryan, Plaut, Davies, & Steele, 2009; Margolis & Fisher, 2002), lack of female mentors and role models (Byrne & Lyons, 2001; Pollock, McCoy, Carberry, Hundigopal, & You, 2004), and lack of knowledge and understanding of CS (Carter,

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