Native American Women in Computing

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INTRODUCTION

In the 1990s, a number of efforts had been made to increase the representation of women in computer science (CS) and computer engineering (CE) education, mostly to compensate for the expected shortfall of candidates from the traditional source: 18-year-old non-Hispanic white males. Yet, women remain underrepresented in the CS and CE disciplines. The underrepresentation of minority women is especially conspicuous and is absolutely glaring among Native American women. Though there are studies on the underrepresentation of women in CS and CE education, there are very few studies on minority women, and there is very little scholarly work on Native American women. Because Native Americans—officially classified as American Indians and/or Alaska Natives—are relatively small in number (1.5% of the U.S. population), they are seldom represented in assessments of gender and/or racial disparities in CS and CE education.

The educational attainment levels of Native American women have improved significantly over the last two decades. Despite these advances, the education level of Native American women remains considerably below the levels of the total population. They are less likely than the total population to graduate from high school, to enroll in college, and to graduate from college (Madrid, 1997). Native American women who do enroll in and graduate from college are less likely to be in science or engineering disciplines. Native American women who do graduate in science or engineering disciplines are less likely to be in CS or CE. For instance, in 2001, Native Americans earned only 271 bachelor's degrees in CS. Of these, Native American men earned 193 and women earned 78. Of incoming freshmen in 2002, only 4% of Native American men and 0.5% of Native American women intended to major in CS (National Science Foundation [NSF], 2004). This article discusses why so few Native American women pursue education in CS or CE disciplines after high school.

BACKGROUND

Most scholarly work on the underrepresentation of women in CS and CE education has been about the gender gap in science and engineering. It is generally assumed that many of the reasons that discourage women from science and engineering education also apply to CS and CE. When scholars have studied women in CS and CE disciplines, they have concentrated mostly on white women. If scholars have considered minority women, the focus has been on blacks and/or Hispanic women (e.g., American Association of University Women [AAUW], 2000; Howell, 1993; Margolis & Fisher, 2002; Martin & Murchie-Beyma, 1992; Moses, 1993; Spertus, 1991; Varma, 2002). These studies reveal gender bias in early socialization at home and in school, feelings of being deficient in mathematics and science, a lack of exposure to computers, the use of computers mostly for word processing, the masculine image of computers, and the absence of female role models—all of which contribute to the underrepresentation of women, including minority women, in CS and CE education. Though most of these barriers are likely to apply to Native American women, there may be additional historical and cultural factors that may play an essential role in their relative interest in CS and CE education.

Native Americans tend to maintain tribal traditions and connections to their tribal community. They are likely to live in what has been called "two

worlds": the world of Native American ethos, which holds that sharing, generosity, and thinking as a group contribute to tribal community survival, and the world of American ethos, which values independence, individualism, and competition to enhance individual success (Benhaim & Stein, 2003). The Native American worldview emphasizes the importance of grasping the big picture before studying particular subjects (Megginson, 1990). Native Americans prefer harmony and group-oriented learning environments to environments that promote individual success (Anderson & Stein, 1992). As a result, Native American students may face more challenges in pursuing a major in a CS or CE discipline than whites, blacks, and Hispanics. Because of patriarchy, cultural values, and social norms, Native American women may have more problems studying CS or CE than Native American men.

This research explores different spectrums to explain the low representation of Native American women in CS and CE education at the undergraduate level. It is based on 50 in-depth interviews of Native American undergraduate students (25 females and 25 males) enrolled in a CS or CE program at six nontribal and tribal universities.

MAIN THRUST OF THE ARTICLE

Many interview students noticed that there are very few women studying CS or CE at their universities, and among the few women, very few are Native Americans. The majority of those who recognized a low number of women in CS and CE disciplines were female. Generally, students from nontribal sites were more likely to mention few women as being an issue than students from tribal sites. One female student said,

We are pretty rare in the computer program. Most of my classes, the ratio is like 1 to 10, 1 female per 10 male students ... These women are either white or Hispanic. I am the only Native woman in the class.

A male student observed, "I do not think there are any."

There are multiple reasons why there are few Native American women pursuing degrees in CS or

CE programs. Because of the patriarchal way of life that dominates children's social and educational worlds, Native American women are historically seen as physically and intellectually less capable than men. Cultural and social notions about Native American women affect the way men view them in CS and CE programs. Although the majority of respondents (76%) indicated that they did not experience incidents related to gender in the CS and CE programs, gender bias and male preoccupations are prevalent among students. A closer look at the data shows that men's expectations and preconceived stereotypes about Native American women are more common than what the numbers might suggest.

For example, the majority of male students mentioned the gender bias was in favor of women. As one male student mentioned,

I often feel that [Native American women] have an advantage because of low male to female ratio ... In some sense they are more successful because they have all the resources from the smart guys who are always ready to help them out.

Another said, "I think [Native American women] get a lot more offers upon graduation than us because companies are trying to make their workforce diverse and it looks good to have Native American women." Another male student believed, "[Native American girls] receive favorable grades just because they are girls." These quotes show that what might appear as bias in favor of Native American women at first might not be the case at the end. For instance, the first student quoted mentions that girls are successful because they work with the "smart guys." In other words, Native American women succeed not because of their intelligence or hard work, but because of the help of somebody else, a smarter male specifically, and that special aid gives them an advantage over men.

Bias in favor of men differs greatly from bias in favor of women. While bias in favor of women relies on the help of others because of the inability of women to perform tasks by themselves, bias in favor of men is based on the simple fact that the student is male. As one female student said, "There is still a perception that males are bosses or think they have a better chance of getting further in their career." A male student believed, "Low representation of [Na-

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