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Changes in CS students' attitudes towards CS over time: An examination of gender differences

Few women major in Computer Science (CS), which creates a serious bottleneck of women qualified to enter the CS workforce. An increased presence of women is imperative if CS is to benefit from women's special skills and perspectives. We cannot afford to underutilize such a valuable and significant part of our workforce.

This study examined whether gender differences in CS students' stereotypes of CS and attitudes towards CS classes and the CS program remain stable from one semester to the next. We proposed that gender differences in attitudes towards CS that are present when students take their first CS class might be augmented, reduced, or even disappear as students take more advanced CS courses. On the other hand, some gender differences in attitudes might not emerge until students are more advanced in their major. No other research on CS had empirically addressed this question, although in our own research on students in Management Information Systems (MIS) we found that gender differences in attitudes towards MIS do not remain stable. An examination of the temporal stability of gender differences was long overdue. If students' attitudes towards CS change as they progress in the major, and especially if gender differences in attitudes change over time, one-time assessments of students' attitudes might lead to erroneous conclusions, which could lead to inappropriate recommendations for intervention.

We surveyed 94 students at both an initial assessment and a follow-up, one semester later. They filled out questionnaires assessing their experience with and attitudes towards computers; stereotypes of CS; their opinions of the compatibility of work and family for women in CS; and attitudes towards CS courses and the program.

Female students had less computer experience, developed an interest in computers later, had less confidence in their ability to teach computer skills to others, espoused less negative stereotypes, estimated longer work hours, and felt more strongly than did male students that women are not taken seriously by male CS faculty and that instructors underestimate women's abilities. For these variables gender differences remained stable from one semester to the next. However, male and female students' perceptions of women's ability to combine family and career became more pessimistic over time. Over time female CS majors became less convinced that computer scientists enjoy being around others. Another troubling finding was that both male and female students felt that the atmosphere had become more impersonal at the follow-up compared to the semester before. An encouraging finding was that over time students were less likely to feel that there is gender discrimination in the department, to feel that female students are underrated by others, and to feel that female CS students' commitment is questioned by faculty. Thus, more exposure to CS faculty had a beneficial effect for majors.

Thus, gender differences in CS students are not temporally stable. In the future, researchers should not jump to conclusions without examining the changing attitudes of both genders over

time. Some gender differences in attitudes towards CS may be reduced over time because those who are more advanced in their CS studies begin to feel assimilated i.e., they see themselves as CS students, instead of seeing themselves as male or female CS students.

One limitation of our research is that it examined the stability of attitudes over a six-month-period. Follow-ups over longer periods of time would provide more in-depth information. We have collected the data and are currently planning to conduct the statistical analyses. Especially interesting would be a follow-up study of students entering the workforce. What happens to gender differences as students transition into the CS workforce?

Our research yielded intriguing results. The findings suggest avenues for recruiting and retaining female CS majors, thereby increasing the number of qualified women entering into CS careers. Concerns about possible future work-family conflict and gender issues in the program (e.g., gender discrimination) present problems.

The finding that in our CS department greater exposure to CS faculty decreased perceptions of gender discrimination and other gender-related issues is encouraging. It suggests that faculty and/or departments can greatly affect female students' comfort level. At the time of the study the CS faculty at our institution was 43% female, which might explain this result. Thus, departments that address the issues we highlighted viz., work-family conflict and issues surrounding gender discrimination may have increased success in retention and recruitment of CS students.

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