6-21-2019

Inclusion of Women in Computer Science

Naomi Johnson
Brigham Young University

Dr. Kevin Seppi
Brigham Young University

Follow this and additional works at: https://scholarsarchive.byu.edu/jur

Part of the Computer Sciences Commons

Recommended Citation
Available at: https://scholarsarchive.byu.edu/jur/vol2019/iss2019/149

This ORCA is brought to you for free and open access by BYU ScholarsArchive. It has been accepted for inclusion in Journal of Undergraduate Research by an authorized editor of BYU ScholarsArchive. For more information, please contact ellen_amatangelo@byu.edu.
Inclusion of Women in Computer Science

JUNE 21, 2019 BY ADMIN

Naomi Johnson, Dr. Kevin Seppi, Computer Science Department

Introduction

Since the 1980’s, the percentage of computer science degrees awarded to women in the United States has fallen dramatically. There are growing numbers of men earning bachelor’s degrees in CS, and the numbers of women are increasing very slowly. For decades, researchers have been studying recruitment and retention of women and other minorities in CS, yet it is still not apparent what departments, professors, or students can do in order to get the numbers of women earning degrees in CS up again.

We reviewed the literature pertaining to the retention and inclusion of women in computer science departments, and submitted our literature review to the 2019 Special Interest Group for Computer Science Education (SIGCSE 2019). We found that there are four main categories of variables being studied. First, research that considers static attributes of female students (race, socioeconomic background, GPA, ACT/SAT score, etc). Second, static attributes of the environment around female students (location of a university, number of students enrolled, etc). Third, research about adjustable attributes of the female students themselves (qualities that could be changed through workshops, courses, mentoring, or other training programs). Fourth, research about adjustable attributes of the environments around female students (aspects of a program like what courses are required in what order, who is teaching, what they are teaching, how they are teaching, etc).

Because we are interested in increasing retention, we were not interested in static factors that are out of our control. We questioned the morality of attempting to change female students, so we decided to focus our research on variables that professors, departments, and other individuals can manipulate to increase retention of all students or female students.

Methodology

We decided to survey about student experiences in order to investigate if some groups of students have different experiences. Although we focused on different experiences between genders and majors, we also explored differences between students of different ages, planned graduation date, and whether they were undergraduate or graduate students. This could help us determine possible causes for low retention rates in introductory courses. It should be noted that although BYU has low retention rates in introductory CS courses.

Our IRB-approved data collection consisted of two parts: First, we emailed every student who took a BYU CS course in Winter, Spring, or Summer term of 2018 (2597 students; nearly half of whom were CS majors) and invited them to take a 75-question, 20 minute survey. We had a 24.3% response rate.

Additionally, we ran a longitudinal study of students enrolled in BYU CS courses during the Fall 2018 semester. Every two weeks we invited them to answer four questions designed to measure their computing confidence and plans with CS in order to better identify when students withdrew from CS courses or lost interest in CS careers.
Results

Overall, it appears that many experiences are similar between female and male students in BYU CS courses. Over 70% of male and female students reported picking their major because of interest in post-graduation career opportunities, and over 40% of both genders reported that high income prospects influenced their choice of major. Over 50% of both genders reported meeting with a professor or advisor to discuss academic progress at least once a semester. All genders reported feeling more comfortable asking questions when they are in smaller classes or when they feel like they know the professor.

However, there were also differences in experiences. Women were more likely than men to be told that they earned a good grade/got a job or scholarship because of their gender (n=, p=). Women were more likely to report that they did not ask questions in CS courses (n=, p=) or that they did not participate in CS courses (n=, p=). Both men and women reported hearing sexist remarks or jokes about their gender, but women three times more than men (n=, p=).

Discussion

It is clear that there are both male and female students who feel that there is gender inequality. For example, when asked “Are there any negative experiences or interactions that you had with members of the CS department that you would like to share?”, a female junior reported that “I have had a professor tell me I should just stick to focus on getting married and having babies. I have had several other students ask me why in the world am I majoring in Computer Science since I am a girl. Several times guys will ask why a pretty girl such as me am in a cs lab.” on the same question, a male senior reported that “…some CS professors grade females easier to encourage more to participate. If so, I believe that this is completely unfair to both genders and sexist in many ways. I also believe it is unfair for either gender to receive scholarships/internships/job offers because of gender, and I believe this happens frequently today.” When asked “Do you feel that some students are held to a higher standard than other students in the CS department? If so, please select all groups that apply.”, only 53% of students said that all students were held to the same standard in the department (n=, p=).

Conclusion

Like most universities in the United States, the BYU CS department is primarily male and struggles to retain female students. Carnegie Mellon University and other schools experience the same rate of male and female students leaving the major during the first two years, but BYU sees more women than men leave the CS major. This ORCA allowed us to begin exploring external experiences that could cause the difference in retention rates between men and women. While we found that many experiences and opinions were reported to be the same between male and female students, others were reported to be different. We recommend that further research investigate differences in classroom participation and TA-student interaction. Additionally, we are concerned about the numbers of female students who report being told that they get special treatment and privileges because of their gender as well as the number of male students who report that it is harder for them to earn a good grade or get an internship because of their gender. Education about the gender gap in CS would likely be beneficial for students of both genders; however, we are not able to make concrete recommendations about which misconceptions are the most common or how to correct them.