Trends in the Interests of Women Pursuing Computer Science

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1. INTRODUCTION

The journey of women in Computer Science has been a tumultuous one. Since the initial, invaluable contributions by Grace Hopper in the mid-1950s, women have largely been unrepresented in computing. Just three years ago, in 2011, woman comprised just 25% of the computing workforce [2]. Between 2000 and 2011, there was a 79% decline in the number of first-year undergraduate women interesting in majoring in Computer Science [2].

We seek to investigate the drivers behind this underrepresentation and lack of interest. What are some of the reasons why women do not have an equal presence in Computer Science? How do a female student's interests in Computer Science change over time, i.e. before and after taking courses in the field?

2. BACKGROUND AND RELATED WORK

There is no inherent reason as to why the participation of women in Computer Science should be significantly lower than men - but statistics show that it is [1, 2].

Existing research on this topic focuses on identified issues that are important to the recruitment of women into Computer Science courses. This was qualitative research that posed questions about the social background of women, their local role models, interest levels, and ability levels [1].

Our research differs in the sense that it focuses on the thoughts of women before and after taking an introductory class, the reasons stated for taking the class in the first place, and whether or not taking this class has changed their mind about pursuing a career in Computer Science.

3. APPROACH AND UNIQUENESS

3.1 Research Question

We want to know 1) why women first take computer science courses and 2) what influences keep them in those courses. We approach this question with a unique focus on the difference in interest level that takes place before and after a subject's first computer science class.

3.2 Evaluation/Experimental Design

For our study, we administered a qualitative survey to 25 women enrolled in Pomona College Computer Science classes. This survey asked women what their thoughts were about majoring in Computer Science before and after they took their first course, why their opinions might have changed, and why they took a Computer Science course in the first place.

We also examine the relative percentages of women in Pomona College's Fall 2014 Introduction to Computer Science course (CS 51) versus the second level of computer science courses (CS 52 and CS 62), either of which can be taken immediately following CS 51. Since these second level courses can be taken concurrently, we counted cross-enrolled students only once in our statistics.

4. RESULTS AND CONTRIBUTIONS

4.1 Qualitative Results

When asked about their reasons for taking their first Computer Science class, participants had various responses, which can be sorted into four categories.

1. First, one popular reason participants gave was the fulfillment of the quantitative skills graduation requirement. Participants often cited taking Computer Science to avoid taking a math class. Essentially, Computer Science was perceived as less undesirable than math.
2. Second, some participants "wanted skills that will be useful in jobs", or were hoping that taking the introductory class will help them apply coding skills to other fields such as biology.
3. Third, other participants cited their desire "to try something new and interesting" and their "curiosity", as well as a lack of previous opportunities to try Computer Science, as their reason for taking the course.
4. The fourth and last reason given by participants for taking a Computer Science course was encouragement by role models (often male), which included a boyfriend, a cousin, and a few programmer father.

Participants also gave various answers to why they changed their mind about pursuing Computer Science after taking the introductory class. A few participants mentioned earlier worries that Computer Science "might be too 'mathy'" or "too hard", but that these concerns were alleviated after taking the introductory course.

Many participants cited their lack of knowledge in the field as the reason they never even thought about trying

Computer Science before and are now definitely majoring in Computer Science. Note that of the four common responses listed above, none includes the desire to enter the technology field. The women surveyed did not seem to have prior experience in Computer Science. One participant said, "[I] didn't know that much about CS before" but discovered that "it's actually pretty fun." A common trend in the responses was that interest in the field increased was that participants often expressed that they enjoyed programming more than they expected to.

When looking at the participants whose interest decreased, a few cited taking the introductory course too late in their college career to take more, while others mentioned Computer Science being not what they expected it to be.

From these responses, it can be inferred that many women do not pursue Computer Science because of a lack of knowledge about what the field is or that they might enjoy it. This is supported by seeing many women cite a curiosity for learning something new as their reason for taking the introductory course, as well as needing to see a role model in the field. Also, many women are surprised when they discover that they actually enjoy Computer Science when they learn what the field is actually like.

4.2 Quantitative Results

We examine the change in the percentage of women enrolled in the introductory Computer Science course versus in the second level of Computer Science courses. Interestingly, just over half of the 63 students enrolled in introductory courses were women (Figure 1). In the second level, the number of women drops to 30 of 83 students (36.1%) (Figure 2).

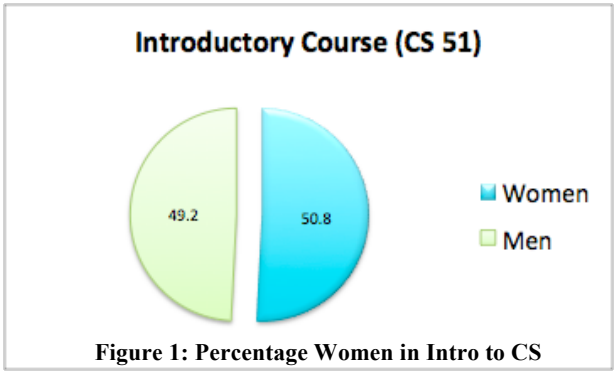

Figure 1: Percentage Women in Intro to CS

Taking one or more Computer Science classes seems to have increased the interest in Computer Science for 64% (16 of 25) survey participants. However, there is still an almost 15% dropoff between the first and second levels. On closer observation, however, the absolute number of Fall 2014 female computer science students holds remarkably steady between the first and second level courses: 32 to 30 students.

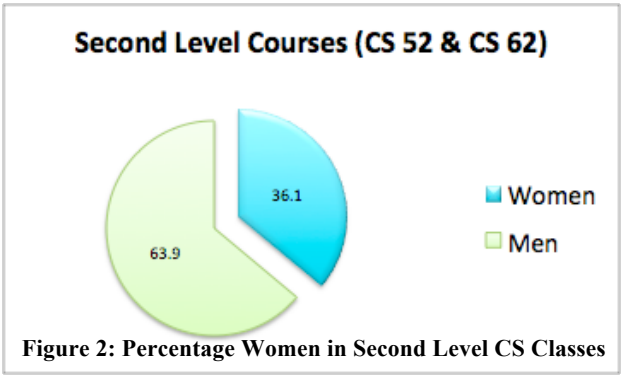

Figure 2: Percentage Women in Second Level CS Classes

This seems to indicate that while the introductory course does not necessarily hold the interest of all female students, the introductory sequence tends to increase the interest of most students.

4.3 Conclusions and Contributions

Research into the motivations and experiences of women in Computer Science can provide insights to help to increase the participation of women in the field.

Specifically, since taking an introductory class helps with encouraging women to take more Computer Science, it is necessary to encourage women to take that introductory course in the first place. Many women take the course out of curiosity or with the encouragement of a role model, simply because of a general lack of knowledge in the field.

Perhaps this problem begins much before college, as women tend to be less exposed to the field than their male counterparts, or perhaps see less role models that they identify with. If women were more educated about the field before entering college, this could lead to more women trying an introductory class, which is an important gateway and influencer in a woman's decision to enter the field of Computer Science

5. REFERENCES

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