Perceptions of women in CSE

Tessa Lau

IBM T.J. Watson Research

`tessalau@us.ibm.com`

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As part of a recent recruiting trip to the University of Washington, I hosted a dinner with seven women in the UW CS&E department — three undergrads and four grads. I wanted to get their opinion on why women are dropping out of computer science and failing to fill the education pipeline that trains top technical women at the BS/MS/PhD level. Studies have shown that the proportion of women shrinks disproportionately in the transition from high school to college, from college to grad school, and from grad school to professional positions in academia or industry. My aim in hosting this dinner was to get a firsthand account of how women perceive computer science, and get insight into this trend.

During a spirited dinner conversation, many disturbing issues were raised. I asked questions about the general perceptions of computer science, what women think is important, differences in communication and interests, and what characterizes a successful computer science graduate. Many of the answers resonated with my own experience as a woman in computer science. Below, I summarize some of the issues that I heard.

Importance of work/life balance

One of the undergraduate students, a single mother, is struggling with a full load of coursework while caring for her child. Another is wrestling with the question of when to start a family, and whether grad school or industry would be the best time to do that. Yet another is worried about the hard work involved in getting tenure, and concerned that there is simply no good time to have children. Family concerns, pursuing interests outside of computer science, and simply "having a life" are very important to these women.

One student mentioned that even though her classes had two-person team projects, she refrained from partnering up with someone because she sometimes had to disappear for a week to care for a child who had taken ill. Rather than inconvenience a teammate, she completed both halves of the project on her own. How can we better support students whose real lives sometimes take priority over their classwork?

Other students commented on how many of their male classmates seem to boast about pulling all-nighters in order to complete their projects. Yet the women I talked to managed to complete their coursework without having to pull any all-nighters. Will these efficient, competent women be perceived as lazy because they work less than others do, even though they do the same work? Are we perpetuating this myth of many hours worked as being more important than the results achieved?

Negative perceptions of computer science

Computer science is certainly viewed as very difficult, and lots of work. Although the students I talked to had already chosen CS as their major, they related experiences their friends had when discussing a CS major with an undergraduate advisor. When the student said she was interested in computer science and was considering taking CSE142 (the introductory programming course), the advisor recommended against it, saying that it was too difficult.

Another negative perception is of the life computer scientists lead: spending all day alone in front of a computer. Women thrive on social interaction; spending all their time in front of a machine can be off-putting.

A common belief is that one needs to be a hotshot programmer in order to succeed in computer science. Part of what that means is arcane knowledge of obscure technical details. For example, some students reported stories of interviews with technology companies (Microsoft, Amazon, IBM less so) that were looking for specific skills such as .NET experience, rather than general problem-solving skills or algorithms. Another perception seems to be that companies prefer people who enjoy working overtime on programming, a requirement that conflicts with the desire for work/life balance.

Problems in the program

The undergraduate curriculum was criticized for being too heavily focused on programming. In addition, several stories were told about bad undergraduate research experiences, in which the undergrad researcher is considered to be "lowest on the totem pole" and does not receive any direction from the faculty on how to proceed or even what research is all about. If this were a student's only experience with research, it would not be surprising if she did not go on to pursue a research career.

Some graduate students also expressed dissatisfaction with their faculty mentoring, citing advisors that did not have enough time for them or did not provide enough direction.

Undervalued skills

One of the questions that was raised was why companies like IBM need to attract more women. Is it simply a matter of evening out the numbers so that we can say that we have a diverse workforce? This question led to discussion about what skills are typically sought after in a computer science graduate, and whether women brought any undervalued gender-correlated skills to the table.

It was suggested that women tend to have broad-ranging interests and the ability to see the wider picture rather than narrowly focusing on a specific area in detail. For example, one of my strengths is cross-disciplinary research that creates synergies between diverse fields; yet I am in danger of not being categorized as a strong researcher in any one field.

Studies have shown that women tend to make better managers, perhaps because of stronger communication skills or an ability to work well with people. Are these skills that are sought after in IBM's hiring process? Are women getting fair treatment, if a traditional narrow-minded focus on programming seems to be the most valued skill?

Communication and networking

Female computer scientists often find it challenging to hold their own position in arguments with their colleagues. Researchers have found that distict communication differences exist between women and men. Women who view conflict as a personal attack can have a very difficult time engaging in technical discussions.

One student also mentioned difficulty networking at conferences and professional events, which typically requires introducing oneself to strangers.

The way forward

A few students mentioned that they are involved in mentoring other young women, or are being mentored themselves by elder students. Part of the difficulty in encouraging women to pursue computer science is overcoming negative perceptions of CS. I suggested that each of the students get involved in mentoring: choose one woman slightly below them, and one woman slightly above them, and establish mentoring relationships in each direction. Not only is this a valuable experience for all involved, it is also a means for spreading the word about what computer science is truly like.

Solutions to many of these problems consist of changing the negative perceptions of CS at a very early ago, such as high school or even younger. One of my colleagues at IBM mentioned that her preteen daughter, whose parents are both computer scientists, claimed that she wasn't interested in computer science because "it's for boys." The important point one student made is that perceptions of both females and males must

be changed, in order to give everyone a healthier, more balanced perception of what CS really means — and what it doesn't mean.

I left the students with a parting word of advice: take the initiative to make things happen. Each of us thinks we're alone in the struggle to succeed and achieve happiness. But there are resources out there, opportunities for change, and people who are willing to help. Opportunities don't just come along, they are created. By working together, we may be able to change the status quo and make the world a better place for women in computing.

I don't know how many of the stories I heard at this dinner were specific to women, or whether they are generic to all students who are studying in this field. I don't know whether they only apply to this department at this school, or across the field. Nevertheless, these women's perceptions are real. Their challenges, and their struggles, are real. What can we do to help them?