

Thesis Project Portfolio

Upward Bound: How Government Programs Increase Adolescent Interest in Computer Science
(Technical Report)

Gender Disparities in Computer Science: Identification of Causes and Solutions
(STS Research Paper)

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Introduction

A necessary first step in correcting the gender bias in the field of computer science is changing adolescent perceptions of the field through exposure. Government programs, such as Upward Bound (UB), that offer introductory computer science courses, such as robotics and web design, during high school have been shown to have a positive effect on high school students' self-efficacy and perceptions of the field. More importantly, these programs have been shown to increase interest in the field, with a considerable number of participants, such as myself, expressing the desire to pursue more knowledge in the field. One of the main reasons many women stray from the field of computer science are stereotypes regarding the field and their own competence. The increased self-efficacy brought on by guided exposure to the subject matter during adolescence could eliminate those feelings of being deficient.

Technical Project

Upward Bound Math/Science (UBMS) is a federal program that addresses educational disparity by offering low-income, prospective first-generation college students support in the form of educational resources and learning opportunities. I was interviewed for the program in the spring before entering high school and received membership. The program requires high school-aged participants to attend a summer learning academy which randomly places them into block classes. One of these, robotics, trained enrollees, such as myself, about coding and computer science through the utilization of tools such as Arduino, technologies from VEX Robotics, and the ROBOTC language. My introduction to this course at age 14 caused me to develop a passion for computer science and ultimately end up pursuing a career in the field.

However, the accessibility to these needs to be addressed so that more adolescents are aware of the program and opportunities available in the field of computer science. My school district did not offer any form of computer science course, and I may have never been introduced to the field without the UBMS program. This is the case in many other school districts as well, and these educational disparities must be addressed in order to ensure diversity of the field.

STS Research Project

There is a clear male dominance of the field of computer science in the United States, with men holding roughly 80% of computer science-related jobs. This is a problem because it leads to gender-related disparities in software-reliant products. Because of this, it is essential to understand why computer science is so unpopular among women in the United States in order to address the gender imbalance of the field and resulting gender disparities in software. To investigate this topic, I gathered secondary sources and primary sources, in the form of questionnaire responses regarding women's sentiments towards computer science. Research has determined that one of the largest reasons women do not pursue a career in computer science are gender stereotypes regarding women in the field. The stereotypical image of a girl in computer science is seen as helpless, uninterested, and unhappy with the subject matter. With this image in mind, many girls feel as though they would be setting themselves up for failure with computer science. Additionally, the relative lack of female role models in computer science careers discourages girls from pursuing a career in computer science. Furthermore, one of the primary reasons young women do not consider pursuing a career in computer science is the manner in which young women tend to choose a career based on its social contributions. Many women initially struggle to envision the social purpose of computer science and engineering, so they are less likely to pursue careers in these fields. Overall, while many factors affect the popularity of

computer science among women, the biggest issue appears to be that many women do not understand the possibilities in the field.

Conclusion

Completing each project has changed my perspective regarding the gender gap in computer science. I had never considered the impact of female role models in the field, though my robotics instructor was female and had a positive impact on my perception of the field. Most importantly, working on the projects together made me reflect on my own perception of computer science. While I identified several factors that negatively impact women's opinions of computer science in my STS research project, a study that I found while researching my technical project shows that most of those factors no longer apply once a student has been through a computer science related course in a program such as UB during adolescence. After these programs, girls have role models to look up to, increased self-efficacy, and a more open mind regarding the possibilities in computer science. Furthermore, they know that the stereotypes are not slightly accurate. Overall, I learned that computer science, itself, is not truly unpopular among women; however, the stereotypical idea of computer science is. Many women simply do not know enough about the field to have a strong opinion.