

Belonging in Computing:

The Contribution of Gender-based Community Building

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ABSTRACT

The pressing need to produce more computer science graduates in the United States to meet the ever-growing number of open computing and technology jobs, and the lack of parity in gender representation necessitates identifying measures to help retain and support more seekers of computer science majors. Fostering a strong sense of belonging to the field of computing has been shown to increase persistence in the major, particularly for women and people of color. In this panel, we will discuss techniques for building community along with personal experiences regarding the impact of having and also lacking that community. Current research on belonging and its impact on persistence will also be presented.

CCS CONCEPTS

• Applied Computing → Education • Social and professional topics → Computing industry.

KEYWORDS

Broadening participation in computing, sense of belonging to computing, persistence in computing

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1 Summary

The field of computing has been plagued by a lack of diversity. In 2019, for example, women earned 57% of all bachelor's degrees, but only 21% of Computer Information Science bachelor's degrees [1]. While there are numerous reasons for this disparity, this panel will discuss one area that research has shown can have a direct impact on retention in the field – feeling like you belong to the community of computer scientists.

Sense of belonging is the emotional need to be with a group of peers and feel accepted and supported. Having a strong sense of belonging to an academic field of study, such as computing, helps the individual feel valued and accepted as an important member of that community. This sense of belonging may or may not correlate with academic achievement, as an individual could have high scores in computing classes and also not feel accepted into that computing community. Research has shown that a sense of belonging to the field of computing is critical to retention, especially for women of color [2] [3] [4]. Research has also shown that a lack of belonging can be destructive to physical and mental health [5].

For post-secondary students, feelings of belonging to their university have been linked to positive outcomes such as greater persistence and retention in the major. Strong student-faculty relationships, good counseling, and campus diversity efforts help foster this sense of belonging, which leads to persistence in the major [6].

A sense of belonging can also be enhanced through a strong community of peers. One such community is the NCWIT Aspirations in Computing community. Consisting of over 20,000 women and nonbinary individuals ranging from high school students to workforce, the Aspirations program's evaluation has shown that the community consistently supports and mentors' members as they work their way through their various academic and career paths in computing. A recent research study on the community Facebook group revealed the strong encouragement and support provided to the members [7]. Another study found that interactions with computer science peers of the same sex led to improved educational experiences [8].

This panel is designed to present research on the connection between a strong sense of belonging and persistence in computing. The research will be supported through presentations

of personal experiences with intentional gender-based community building, the impact of a strong community on individual persistence, and the need for a community of women to support persistence at the graduate level.

2 Panel Structure

The panel moderator will spend 10 minutes introducing the concepts of sense of belonging to computing and its impact on persistence in computing. After introducing the panelists, each speaker will discuss their unique perspective on the topics for 10 minutes. The final 25 minutes will be spent in an interactive question and answer session guided by the moderator. This structure will work as in-person or virtual.

2.1 Lyn E. Swackhamer

As the Director of Aspirations Evaluation for NCWIT, I conduct mixed methods social science research and evaluate the effectiveness of our Aspirations in Computing programs. I have a BBA in Business from North Georgia University, and a MA in Curriculum and Instruction and a PhD in Educational Leadership (emphasis on research and evaluation methodologies) from the University of Colorado. In the role of moderator for this session, I will present the relevant research on belonging to computing and its impact on persistence. After the panelist's presentations, I will connect their individual experiences to the research and lead a discussion on how these personal experiences can inform computer science educators in their efforts to create inclusive academic environments and retain women students.

2.2 Terina-Jasmine Alladin

I have been the NCWIT Aspirations in Computing Community Engagement Manager since 2016. It is my job to inculcate a sense of belonging in the virtual community of thousands of women in tech that NCWIT has been building over the past 14 years. I do that through hosting synchronous information sessions, panels, and meet-ups, among other convenings. In my role, I draw from my experience as a consultant serving a variety of arts, tech, and public institutions, and a graduate student pursuing a MSc in Sports Technology and Digital Transformation with the Real Madrid Graduate School, focusing on Artificial Intelligence and Data Science. In all my roles, I focus on uplifting women, people of color, immigrants, and people with disabilities. In this panel, I will present my perspective on community building as a woman of color in the technology field and share techniques that have worked well for NCWIT.

2.3 Hana Memon

I am a second-year student at Barnard College studying computer science. During my first year of study, I conducted human-computer interaction research at The College of New Jersey and Computer Vision research at Brown University. I also served as the Freshman representative of my school's ACM club and was Secretary of the Girls Who Code Club. I currently serve as a community ambassador for Kode with Klossy and coach at Major

League Hacking where I work to close the gender gap in technology and empower hackers respectively. I have been part of the Aspirations in Computing community since 2018. I will discuss how my initial experiences with technology pushed me away from the field, but after finding a community of women, I changed directions and decided to pursue technology.

2.4 Amy J. Ko

I am a Professor at the Information School at the University of Washington, Seattle, and a transgender woman of color. My research focuses on programming, and most recently on our individual and collective struggle to understand computing and harness it for equity and justice. My service engages a wide range of community building, including in my role as the program chair for our undergraduate program in Informatics; my role as the director of CS for All Washington, a statewide K-12 CS equity advocacy organization; my role as Co-PI of AccessComputing, an NSF-funded broadening participation in computing alliance; and my role as a mentor to many LGBTQ students and faculty across academia. On this panel, I will speak about my experiences fostering communities and mentoring women and trans and non-binary people in computer science from an intersectional lens.

2.5 Shira Wein

I am a third-year Computer Science PhD student at Georgetown University, doing research on natural language processing with a goal to pursue a Professorship. In 2021, I was named a Clare Boothe Luce Scholar, which helps support my research. I graduated from Lafayette College in 2019 with a B.S. in Computer Science and a B.A. in Spanish, where I was very involved in a Women in Computing group and served as President from 2017-2019. I joined the Aspirations in Computing community in 2018. I will discuss my experiences with Women in Computing groups as an undergraduate; sexism in computer science that has pushed me to seek the Professorship; and the lack of community for women in graduate school.

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