Project: Developing a culturally responsive framework for promoting computing among adolescent girls in STEM programs

Mentor: Dr. Patricia Garcia

Despite the fact that women represent the largest percentage of enrolled students in four-year institutions, women of color continue to be disproportionately underrepresented in computer science. In response, many stakeholders have focused on increasing the participation of girls of color in extracurricular computing programs. Unfortunately, many computing programs for girls of color simplify the complex problem of disparity in computer science using deficit-based accounts that associate inequalities in computational learning with girls' motivations and access to networked technologies (Vakil, 2014). In an effort to counter deficit-based approaches, this project explores how to improve girls' academic success and social development in computing education by "merging computational thinking with cultural practices" (Eglash, Gilbert, & Foster, 2013, p. 33). Our approach draws from the theory of culturally responsive pedagogy, which values the cultural wealth that diverse students bring into the classroom and encourages educators to shape their teaching practices and forms of assessment in ways that are responsive to students' cultural orientations (Howard, 2012; Gay, 2000; Ladson-Billings, 1995).

The project is guided by two main objectives. First, this project explores how researchers can analyze data points and artifacts that capture girls' voices, such as personal essays, to locate self-identified cultural markers. This goal will be accomplished by analyzing an existing data set of responses to semi-structured questions related to girls' identities and future plans for academic and professional success gathered from a group of 398 Black girls who applied to a leadership conference. Second, this project aims to develop a conceptual framework for culturally responsive computing education that is informed by self-identified cultural markers and can be used by practitioners and community organizations who are designing and implementing STEM programs in various learning contexts.

Student Role

The student's contributions to the project will advance the study of how cultural supports may positively impact computing education and learning experiences for girls from marginalized groups, such as racial and ethnic minorities. The student will gain exposure to the culture of research by participating in individual and team research meetings, reviewing scholarly literature related to gender equity in STEM, analyzing qualitative data using NVivo, and contributing to peer-reviewed publications, posters, and conference presentations.

Specifically, the student will participate in the following research experiences:
- Attend weekly collaborative and interdisciplinary (education and information studies) research meetings with PI and research team;
- Conduct literature reviews related to the use of culturally responsive pedagogy in computer science education contexts;
- Contribute to the iterative development of qualitative codes and a codebook;
- Conduct data analysis using qualitative data analysis software such as Dedoose;
- Practice professional skills such as collaboration, project management, and presentational speaking.

Mentorship Plan

The student will meet with the mentor weekly during individual meetings. The individual meetings will focus on developing personalized goals for academic, professional, and personal growth. These goals will include identifying research interests, outlining specific skills and/or knowledge they hope to gain through the experience, and determining strategies for reaching their goals. In order to make these goals concrete, the mentor will assign related research activities such as literature reviews and a poster presentation.

In addition to individual meetings, the student will participate in weekly team meetings where they will be exposed to an interdisciplinary and collaborative culture of research. The research team is composed of doctoral and master’s students from the University of Michigan School of Information and School of Education. During the weekly meetings, students will participate in discussions of relevant literature, brainstorming sessions on avenues for scholarly publications, and discussions on how to properly manage and protect confidential research data.