

Guzman, D., Nguyen, L., Imroz, A., & Ihorn, S. (2021). Attitudes and self-efficacy in computer science education. Poster presented at the annual meeting of the American Psychological Association, Virtual Conference.

In response to growing concerns about underrepresentation of women and Black and Latinx individuals in the field of computer science (CS), in 2016 a diverse, urban university created a novel new minor program with the goal of increasing diversity in computing. This program focuses on recruiting and retaining diverse groups in order to increase their presence in CS, with the hope that improved representation will change the prevalent stereotypes about CS in regard to its difficulty, abstraction from the real world, and lack of diversity (Kulkarni et al., 2018). The present study investigated how attitudes towards CS, general self-efficacy, and computer programming self-efficacy differ between students enrolled in this new minor program and those participating in a more traditional CS major at the same university.

A total of 134 students participated in at least one portion of the administered survey. Of the students involved with the new minor program, 86% were female, and 52% belonged to an underrepresented racial group. Those not involved with the minor program were 80% male and 25% belonged to an underrepresented group.

To assess students' CS attitudes and general and CS self-efficacy, a questionnaire was distributed to students via Qualtrics. Attitudes towards CS were assessed using items from the Usefulness, Interest, and Confidence subscales of the Engineering Students Attitudes Towards Computer Science scale (Hoegh & Moskal, 2009). General self-efficacy was assessed using the Self-Efficacy for Learning and Performance subscale of the Motivated Strategies for Learning Questionnaire (Pintrich et al., 1993). CS self-efficacy was assessed using the Computer Programming Self-Efficacy Scale (Tsai et al., 2019).

Students participating in the minor program reported significantly lower levels of self-efficacy ($M = 69.05$, $SD = 12.90$) regarding their computer programming skills than other students ($M = 77.30$, $SD = 12.86$), with $t(83) = 2.46$, $p = .016$, but no significant differences were found between the two groups' attitudes towards computer science or their general learning self-efficacy. This means that all participating students reported similar attitudes towards CS - with regards to their beliefs about its usefulness, their interest in it, and the confidence about their abilities - and also report similar levels of self-efficacy about their ability to learn the CS concepts required for their program of study, but female, Black, and Latinx students enrolled in the minor program feel less confident in their specific computer programming skills than more traditional CS major students.

The findings regarding the similarity of attitudes toward CS and general learning self-efficacy demonstrate that both groups of students are similarly equipped with the psychological tools necessary to do well in CS courses. Further, both groups feel confident and capable of learning effectively in their CS courses. While all students reported similar levels of self-efficacy regarding their ability to do well, the minor program students reported feeling significantly lower

levels of self-efficacy regarding their abilities with specific computing concepts and skills. Future research efforts are needed to fully understand the reasons behind these findings on computing self-efficacy. Expanded discussion and implications for practice will be presented.