Oral Defense Announcement
University of Missouri – St. Louis Graduate School

An oral examination in defense of the dissertation for the degree
Doctor of Education with an emphasis in Educational Practice

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The Impact of Collaboration, Problem Solving, and Creativity on
Computer Programming Education for Middle School Girls

Date: July 10, 2023
Time: 2:00 p.m. to 4:00 p.m.
Place: Bayer Room – TLC

Abstract

Despite high scores and abilities, girls lose interest in science and math throughout middle school. According to the Bureau of Labor Statistics, jobs in the computer science research field will grow 19% by 2026; however, only 18% of the bachelor’s degrees in computer science are earned by women in the United States (ComputerScience.org, 2021). New technology and inventions are being created without the benefit of more diverse perspectives and input from females. There is a need to engage girls and maintain their interest throughout middle school and beyond. Additional research needs to be conducted about the impact and best practices used during out-of-school time programs to encourage and motivate girls to stay engaged in STEM, including computer programming (Koch, 2014).

This study investigated the relationship between middle school girls’ interest in computer programming and the opportunities to collaborate, solve problems, and use their creativity while participating in computer programming activities led by female role models during the 4-H Girls Tech Challenge, an informal education program. Research questions are the following: 1) In what ways did the 4-H Girls Tech Challenge experience, which included components of problem solving, collaboration, creativity and female role models, affect the attitudes of middle school girls towards computer programming? 2) To what extent did the 4-H Girls Tech Challenge experience affect the attitude of middle school girls towards potentially pursuing careers related to computer science and technology?

Evidenced by other studies, experiences in which collaboration, problem solving, and creativity are present have been shown to increase knowledge about computer programming and engagement in STEM (Cooper & Heaverlo, 2013; Wu-Rorrer, 2019; Hayden et al., 2011). A qualitative study employing interviews with previous participants was utilized to determine how the components of collaboration, problem solving, and creativity of the 4-H Girls Tech Challenge affected the attitudes of middle school girls towards computer programming and careers in computer science. Educators will benefit from learning more about best practices that engage, motivate, and retain more girls in STEM. An increase in the number of women in the STEM workforce will maximize innovation, creativity, and competitiveness (Hill & St. Rose, 2010).

Defense of Dissertation Committee
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