

Chapter 1

Providing Near–Peer Mentorship to Increase Underrepresented Minority Youth Participation in Computing

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ABSTRACT

Literature shows that mentors and role-models directly affect young students' self-efficacy and motivation to pursue specific academic fields and careers. To explore this further, this chapter describes a free, 9-Saturday programming camp for middle school students with near-peer mentors (first year, college student instructors) and local guest speakers. This camp served 28 underrepresented minority students (17 boys and 11 girls; grades 5-7) from a low-income, urban area. In a pre-camp survey, the middle school students predominately reported not having any role-models or mentors in computing. However, when asked again on the final camp day, these same students indicated developing strong connections with their near-peer mentors and even saw these older students and guest speakers, as role-models. These results highlight the need for young, underrepresented minority students to have more opportunities to interact with potential mentors and role-models, and the importance of providing resources to help develop and nurture these connections.

INTRODUCTION

Computing jobs continue to be among the fastest growing career areas with high demand all over the world (Carnevale, Smith, & Melton, 2011; Department of Labor Statistics, 2018). However, recent statistics indicate that youth—especially those from underrepresented and underserved minority groups—are not pursuing related educational opportunities or careers (Department of Labor Statistics, 2018). This is a major issue, as inadequate representation in the workforce can potentially lead to severe inequities and

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bias in software design and use (Patterson, 2005). Therefore, we must explore new ways to both engage a wider audience and sustain their engagement with learning computing skills to better deal with the lack of diversity and low numbers of those pursuing computing related education and careers.

The study described in this chapter reports on research addressing inequities in computing education for low-income, underrepresented and underserved minority, middle school students, their lack of mentors and role-models in computing, and how a coding intervention (i.e., a programming/coding camp) with university student instructors can affect this. For this study, we surveyed middle school students before and after they participated in programming activities which included with an educational programming game, website design curriculum, and block programming curriculum. We specifically focused on middle school students, as literature has shown that this is the time when youth begin to form strong, lasting ideas about their academic interests and future careers (Denner, 2011; Eccles & Harold, 1993; Hill & Wang, 2015). The goal of this undertaking was to provide underrepresented and underserved minority, middle school students with a positive, introductory programming experience along with similarly-aged instructors, for them to develop constructive mentee-mentor relationships, and to document evidence that these types of programs yield benefits beyond learning how to code.

BACKGROUND

Middle School Students

Developmental and educational research has shown that youth begin to form ideas about future educational interests and career aspirations during their formative years in middle school (Denner, 2011; Eccles & Harold, 1993; Hill & Wang, 2015). As such, many more efforts are now focusing on exposing and teaching students Computer Science (CS) at a younger age in both school curricula and afterschool programs. Many of these efforts begin by using programming environments that are user-friendly and have the potential to lower the cognitive threshold for novice programmers, such as Alice (e.g., (Kelleher & Pausch, 2007a; Kerr, Chou, Ellis, & Kelleher, 2013)), Scratch (e.g., (Maloney, Peppler, Kafai, Resnick, & Rusk, 2008)), Gidget (Lee & Ko, 2015), and others (Grover, Pea, & Cooper, 2016). Reports on the outcomes of these efforts show that young, novice programmers are engaged and effectively learn basic programming skills and concepts (e.g., (Kurland & Pea, 1985; Lee & Ko, 2015; Maloney et al., 2008)) and support computational thinking (Wing, 2008). For example, Kelleher, Pausch, & Kiesler (2007b) found that Alice kept middle school girls engaged with programming, even during break times. Meerbaum-Salant, Armoni, & Ben-Ari. (2013) reported that their middle school students learned most of the targeted CS concepts using Scratch, and Lee & Ko (2015) found similar results with the Gidget programming game, where users exhibited significant learning gains for targeted CS concepts. This study extends these past works, specifically examining how utilizing some of these tools in a coding camp with similarly-aged instructors might affect underrepresented and underserved minority middle school students' views about access to computing mentors and role-models, and their ideas for future academic interests and/or careers.

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