Chapter 5
Historical App Developers:
Integrating CS into K–12 through Cross-Disciplinary Projects

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ABSTRACT

Unlike enrollment in undergraduate computer science degree programs, there are no gender or ethnic imbalances in K–12 enrollment. This chapter discusses an approach to broadening minority participation in computing through the integration of computer science (CS) into history courses. It presents an alignment between computational thinking and historical thinking that makes history courses an attractive fit for CS integration. It also presents a project-based approach using MIT App Inventor that leverages students' interests in mobile technology to facilitate the creation of historical mobile applications. This chapter outlines key findings from a two-year study on integrating cross-disciplinary curricula into history courses and the impact on minority students as they become knowledge, artifact, and technology producers rather than mere consumers.

DOI: 10.4018/978-1-5225-2005-4.ch005

INTRODUCTION

Over the past six years, my research lab, colleagues, and I have worked to design informal and formal learning environments to provide entry points into the computer science (CS) pipeline for minority students and students who might not normally consider taking a CS course or pursuing a CS major. Our efforts have largely paralleled the increased national focus on computational thinking and expanding CS into K–12 education (Ahamed et al., 2010; Astrachan & Briggs, 2012; Margolis, Goode, & Binning, 2015). Like most CS outreach efforts (Valla & William, 2012; Ericson et al., 2016; Resnick et al., 2009; Peppler & Kafai, 2007) we started with after-school and summer programs that targeted students who had expressed an interest in, or at least a willingness to explore, CS. However, we realized that we were often drawing in the same students who were already involved in their robotics club at school or enjoyed playing video games. Thus, we found that this approach still left us primarily isolated from the majority of the K–12 students, who were unaware of their interest in CS, the availability of programs to help them explore a possible interest, and computing careers.

As we expanded recruitment efforts for our after-school programs and summer camps, we began offering students a chance to explore their existing interest in non-computing domains such as music, fashion, and sneakers, through the lense of computer science (Gardner-McCune, McCune, Stallworth, & Edwards, 2013). We offered them an opportunity to "look under the hood" of their passion and see the role that computing plays and can play in improving their lives and the lives of others. However, we still struggled to gain the minority participation we desired as we scaled up these programs.

As we considered how to reach more female and minority students with diverse interests, we began exploring K–12 classrooms. In considering the general demographics of K–12 classrooms, we found that we do not see the same gender deficiencies in CS undergraduate enrollment because of the natural 50/50 distribution of males and females in the K–12 population. This is in stark contrast to the 12–25% distribution of females among undergraduate CS majors at universities where emphasis is placed on recruitment and retention of female students (Alvarado & Judson, 2014). In addition, there are relatively few ethnic imbalances in K–12 enrollments in math, science, social studies, and English because all students are required to take these courses. Moreover, as of fall 2014, minority student enrollment in K–12 education was projected to exceed white student enrollment for the first time ever (The Condition of Education, 2016). Thus, in core courses that are required by all students, access and opportunities to interact with diverse student populations is almost guaranteed and only varies by the demographics of the school and district.