

Chapter 6

Connecting With Industry in Computer Science Education

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ABSTRACT

As technology becomes a more influential part of our everyday life the need for those skilled in computer science increases. With concerns over the diversity and representation of the computer science pipeline, companies and organizations are stepping up to support teachers in elementary, middle and high schools to help prepare the next generation of programmers and technology workers. This chapter will describe efforts from the tech industry to support teachers in teaching computer science including support of consortia like Code.org, and developing curricula and training. It will also outline efforts working with organizations to train and place computer science professionals in K12 classes to volunteer, teach and provide role models to future computer scientists.

INTRODUCTION

Computer science education is a growth area in K12 education for several reasons. Research has shown that is a considerable pipeline problem in computer science. We need more programmers than we are currently preparing and we need those computer scientist is to represent diverse voices. In Silicon Valley they refer to it as 3% problem referring to the small percentage of Black and Latinos in tech companies (Bharwani, 2017). Code.org (2019) reports that in 39 states, only 45% of schools teach computer science and the access is even lower for lower socioeconomic, rural, and schools that serve Black and Latino students. This is particularly important because 98% of all computer science majors reported that they had exposure to the career field before college (Bharwani, 2017). Focusing on integrating computer science in K-12 settings seems to be a necessary step to diversify employees in the technology sector.

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Another concern is the gender gap in computer science. As students progress through their education, representation of women in the field decreases (Camp, 1997). In 2017, a study by Accenture and Girls Who Code found that women in the tech industry continues to fall and by 2025 women will only represent 23% of those in the industry (Nasser, 2017). The study goes on to say that the issue is occurring at the K12 level where computer science is popularized for boys but not for girls and that a cultural shift must occur at an early age to change the trend (Nasser, 2017). Much work has been done on this problem in the last 20 years, which often includes providing young girls with female role models from the tech industry to counteract stereotypes that may serve as educational gatekeepers to female students pursuing computer science careers (Cheryan, Master, & Meltzoff, 2015). All of this work calls for more computer science education in K12 schools that is responsive to underrepresented groups including minorities and women.

This shortage has created a crisis for companies that depend on a computer science workforce to create the innovations that users have come to expect. In 2019, there are 483,935 computer science jobs open in the United States and the college computer science programs only graduated 61,642 students into the workforce (Code.org, 2019b).

Many states are adopting computer science standards and making computer science coursework mandatory for graduation (Code.org, 2018). The adoption of computer science standards in states has risen from seven states in 2017 to 34 in 2019 (Code.org, 2019). This can help to alleviate some of the pressures on the computer science pipeline, because students with computer science experiences in high school are more likely to major in computer science in college (Code.org, 2019b). While computer science requirements may be a positive change that encourages students to pursue high paying STEM careers, this is creating a significant pressure on school districts for curriculum development and qualified teachers for computer science content. To that point, in 2018, only 33 states plus the District of Columbia offer computer science education licensure (Code.org, 2018). Many teachers who are teaching computer science may have no formal training beyond short professional development provided outside of a college setting. These pressures are creating a need to partner with industry and an opportunity for industry both local and national to support education and the adoption of computer science education from kindergarten to grade 12.

Industry has risen to the challenge on both international and local levels by providing support, curriculum and industry connections to schools. The integration of computer science education offers an opportunity to supplement the curriculum, making connections between the technologies that students use and the companies that make them. It also offers an opportunity for schools to engage their local community and welcome technology professionals into their classrooms. Meanwhile, technology companies could welcome teachers into their workplaces during summers to have externships to gain practical workplace knowledge they can add their curriculum. There are two main ways that industry is supporting the integration of computer science education into the curriculum - providing curriculum and training for teachers and offering opportunities for industry professionals to interact with students and teachers. Both of these approaches are designed to offer relevance to students and support to teachers, many of whom may not have formal degrees in computer science.

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