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CS in HS: Promoting Computer Science Education in High School

Trevor Ross

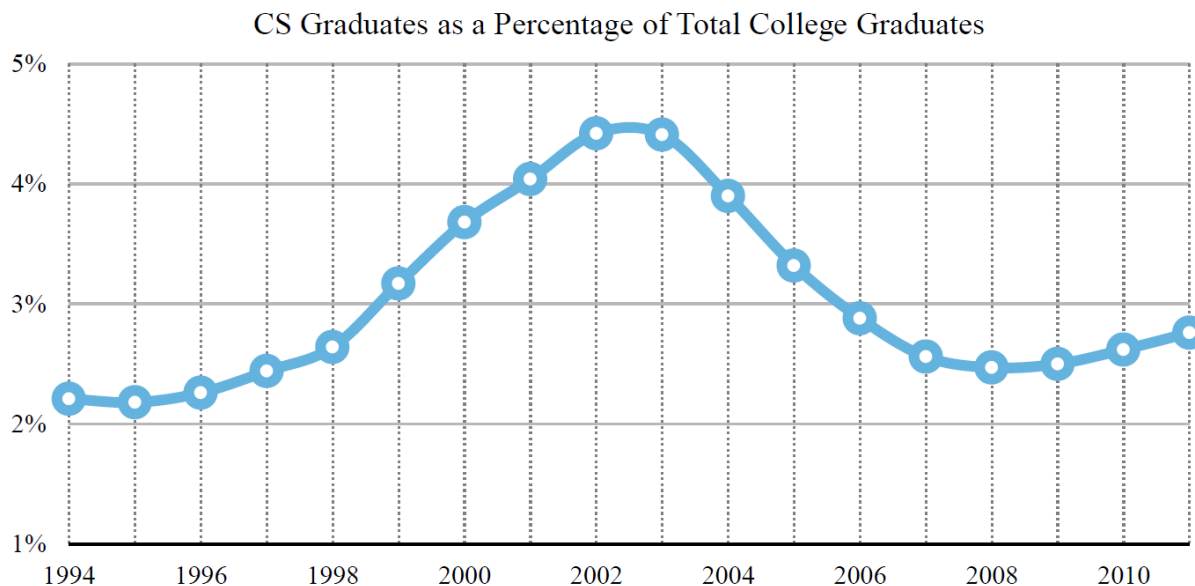
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The world is in the midst of a technology revolution. Each day, new computing devices are introduced, hundreds of new websites are created, and people who have never used the Internet are trying it out for the first time. Nearly two thirds of Americans currently own a smartphone, and that number will only continue to climb (Fingas, 2014). Even cars, thermostats and refrigerators are becoming computerized and connected. This isn't groundbreaking information; most people are aware of this. What isn't common knowledge, however, is who creates this technology. How does Google always seem to know exactly what you are asking for, even when you're not sure how to ask it? How does Facebook manage to accommodate the various needs and interests of over 1 billion users each month (Protalinsk, 2014)? Who is responsible for making this technology so comprehensive? The answer to the last question, of course, is computer scientists, software engineers, database administrators, computer engineers and others in the technology industry. These computing jobs have shaped the modern world in ways only science fiction could have predicted. These people are responsible for some of the greatest innovations of the last century. They work every day on technology that is shaping the future. However, it is the future that is looking bleak. There are currently too few college graduates suited to fill the demand of the growing tech industry.

Declining Workforce for a Growing Industry

Hopeful, young college graduates are not exactly overwhelming the tech industry. There are

not enough college graduates able to fill the positions available in the tech industry. This seems



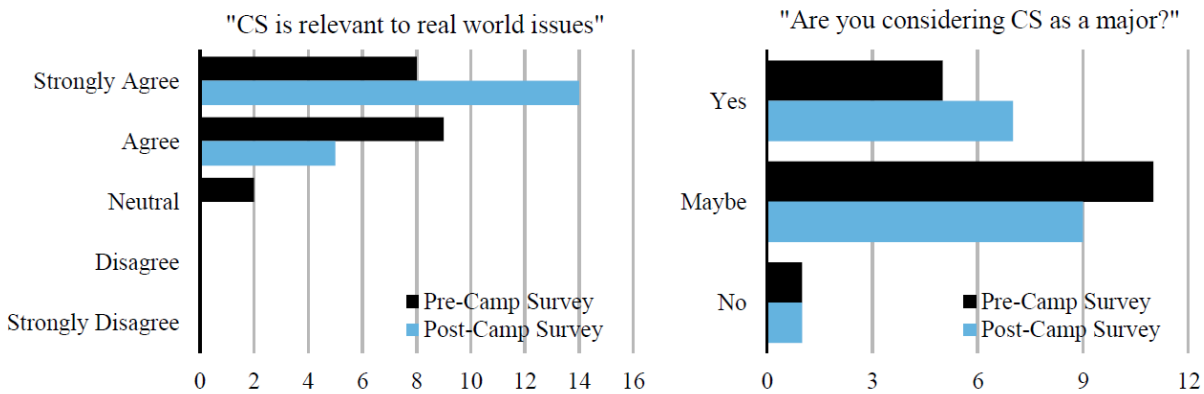
counterintuitive: a growing industry with thousands, if not millions of high-paying jobs will go unfilled due to the lack of potential hires. The college major that is needed to fill many of these computing jobs is Computer Science (CS). Unfortunately, there aren't enough college students majoring in Computer Science to fill the growing demand of the tech industry. In fact, the number of CS majors in American universities is barely growing at all. For example, in 2002, 4.42% of all college graduates were Computer Science majors. In 2011, only 2.76% of college graduates majored in Computer Science (Bui, 2014). This contrasts greatly with the speed at which the tech industry is growing. Code.org estimates, with the help of data from the Bureau of Labor Statistics, that by the year 2020 there will be approximately 1.4 million new jobs in the tech industry, but fewer than 500 thousand new CS graduates (“Computer Science: America's Untapped Industry”, 2015; Bureau of Labor Statistics, 2015). The United States may lose its crown as king of technology if we cannot fulfill the demand of the industry.

There is obviously a problem, but is there a solution? Students cannot be forced into a major, and college graduates with degrees other than CS will not be able to fill these demands without formal

education. However, universities might be the wrong place to look for potential CS majors. By the time students enroll in college, they are expected to have already declared a major. Students cannot be expected to declare their major in a field they know relatively nothing about (Elrod et al., 2006). Students must discover Computer Science prior to college. That's right - hope lies with teenagers. The current state of high school CS programs, however, is abysmal. Roughly 90% of high schools do not even have a CS program (Cuny, 2011). Of the remaining 10%, the programs are inconsistent. Some offer the potential for college credit, some do not; some teachers have a background in CS, some do not ("Making Computer Science Fundamental to K-12 Education," 2014). There is no wonder so few students seek degrees in CS; many of them have never been introduced to the subject at all.

Experience Equals Enrollment

Every high school in America needs to offer a well-structured CS program with certified teachers. If this goal were met, it would have a huge impact on the number of students that major in CS in college. Several studies have shown that once kids are exposed to Computer Science as a subject, they are more likely to consider CS as a major in college: Gannod et al. (2014) conducted such study in the form of a CS boot camp aimed at introducing high school girls to Computer Science. The participants were polled before the camp had begun and after the camp had ended.



Their responses show just how much of an influence even one week of CS exposure can have on their views. When asked if "CS is relevant to real world issues", researchers found a significant increase in positive responses after the students had attended the camp. Furthermore, responses also changed for the better in the post camp survey for the question "Are you considering CS as a major?" (Gannod et al., 2014). This evidence is hopeful. If students are given the chance to try out Computer Science in high school, they just might decide they like it enough to declare it as their major.

Thankfully, there are others fighting for the same cause. The National Science Foundation has launched the CS10K Project, which plans to bring Computer Science to 10,000 new high schools by the end of 2015 (Cuny, 2011). Additionally, in 2010 Google and Microsoft launched "Computing in the Core". This coalition also focused on promoting CS education in K-12 schools throughout the US (Mabry, 2010). Since 2010, Computing to the Core has merged with Code.org and eventually partnered with ACM (Association for Computing Machinery) to create a powerhouse in the movement of promoting CS education in secondary school ("Code.org partners with ACM," 2013). They have produced many videos with big names such as Mark Zuckerberg and President Obama, voicing their support of CS in high school.

Moving toward a Solution

Fortunately, these movements are making a difference. In April, Congress introduced a bill that would name Computer Science as one of the “core academic subjects” in U.S. K-12 schools. This proposed update to the *No Child Left Behind Act* would add Computer Science to a list of subjects that are likely to be found in K-12 curriculum nationwide (Senate, 2015). This is a fantastic step forward for the movement but certification of a core subject does not mandate the subject be taught in high schools. Rather, it underlines each core subject’s importance, making it easier for secondary schools to receive funding for a new “core academic subject” to be added to the curriculum (“Core Academic Subjects: Why Should Computer Science Be Added?” 2013).

This bill shows that strides are being made in the right direction, but the work is nowhere close to finished. Computer Science has given the world smartphones, smart cars, smart homes, and hopefully soon, more smart kids. There are many bright people who have put in work to make these things possible; but sadly, the computing industry is still in low supply of Computer Science majors. Many students do not learn about Computer Science until they reach college, if at all. By then it may be too late to inspire them to join a workforce that is desperately in need of their skills. Students need to be educated on Computer Science in high school so that those who would succeed in the field have ample time to decide if CS is right for them. If every secondary school in the US provided students with the opportunity to learn Computer Science, there would be a new surge of CS majors in universities and eventually in the tech industry. Americans are hungry, the world is hungry, for more technology, more apps, more Internet, each and every day. Let’s give them what they want. Let’s promote CS education in high schools, so that today’s dreamers can become tomorrow’s computer scientists.

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