

Research Implications of the Tech Exchange: Immersion of Howard University Computer Science and Informatics Students in Silicon Valley

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Abstract

In this paper, we begin the process of designing a study which will study the implications of Howard University's Tech Exchange program where students are embedded in Silicon Valley taking courses at Google instead of their home campus in Washington, D.C. Given the partnership aimed at increasing diversity in Silicon Valley, it is worth exploring mechanisms by which this strategy can be assessed in terms of benefits not only to Google and Howard University, but also the student and their identity development and self-efficacy in informatics.

Keywords

Diversity, Research, Computer Science, Information Systems, Silicon Valley, Tech, Industry Partnerships, Pedagogy

Overview

Black people comprise 12-13% of the population in the United States (U.S. Census, 2015), and despite efforts to increase diversity in the Information Technology (IT) workforce, they remain vastly underrepresented in IT. Fostering a workforce that values diversity, regarding race, gender, and sexual orientation is useful in assisting underrepresented groups to adapt to a new workplace. Furthermore, diverse workplaces tend to have managerial staff that are more aware and responsive to different cultures. This attribute then aids in the organization's approach and perspective to launch new products, create new ideas, assess emerging trends, and develop new marketing plans (Martin, 2014; Adler, 2002, Florida, 2014). Another approach looks towards post-secondary education and the totality of Black student experiences, including the impact and influence of university culture and self-efficacy (Strayhorn, 2013; Bonner and Bailey, 2006; Cuyjet, 2006; Cain and Trauth, 2017). The issue of underrepresentation is noticeable outside of the research space as well. Per a report by the College Board (2014), which is the entity that administers the Advanced Placement (AP) exam, of the 30,000 students who took the AP exam in Computer Science, only 4% were Black. In fact, in 11 states there were no Black students that took the AP exam for Computer Science. Despite the low number of Black high school students that took the AP Computer Science exam, the National

Science Foundation (2012) revealed that Blacks earned 10% of Computer Science degrees. The interest in Computer Science is apparent but is not cultivated and made accessible in high school.

According to Anderson, Williams, Ponjuan, and Frierson (2018), Blacks accounted for 3.9 percent of all bachelor's degrees in engineering in 2016. Additionally, Blacks obtained 2.2 percent of all master's degrees earning in engineering fields that same year. When evaluated over a running five-year period, 2011 - 2016, the number of Blacks earning undergraduate degrees in engineering increased by more than 34 percent. As evidenced by these summary statistics, Blacks have demonstrated a desire to pursue technology as a career choice. However, Black graduates are less likely than White and Asian individuals to enter into a tech job. When the employment data from Silicon Valley tech companies are evaluated, striking trends emerge. Facebook Inc. (2018) reports that 4 percent of its U.S. workforce is Black, while failing to mention specifically what percentage of those employees actually occupy technical roles. Unfortunately, in this situation, Facebook is far from being an outlier. At Google Inc., 2 percent of its workforce is Black; meanwhile, Twitter reports 3 percent, LinkedIn reports 4 percent, eBay reports 2 percent, Microsoft reports 4 percent, Intel reports 4 percent, and Apple reports 9 percent (McCandless, 2018). Facebook's decision to exclude the number of Blacks in technical roles may be related to another study that found that 10 percent of Black computer science and engineering graduates occupy office support roles, which include administrative support and accounting (Bui and Miller, 2016). Additionally, while Apple has the highest percentage of Black employees of the companies listed above, it is worth mentioning that the nearly half of those employees, are apart of the sales function (i.e., Corporate Sales and Retail Sales) and therefore, not functioning in a technical capacity. When adjusting for the difference, that would place Apple squarely in the middle of the pack with the rest of the aforementioned companies. A report by the EEOC (2016) found that technology firms hire fewer underrepresented minorities compared to all industries nationwide. The EEOC's data reveals that there is not enough diversity in IT fields, inclusive of engineering and computer science, particularly among the Black population. Regardless of where one chooses to launch an investigation of underrepresentation in IT, whether it be at the primary, secondary, post-secondary or workplace level, there is one theme that remains a constant - that is that the lack of diversity is a problem and there is a disconnect between Black students who may be gain exposure to Computer Science in primary and secondary education versus those whose introduction occurs at the collegiate level.

Tech Diversity Issue – HBCU Resource Issue

Silicon Valley, in particular, has a diversity problem and has employed several strategies to improve the number of underrepresented employees (Kang & Frankel, 2015). One of these strategies is the immersion of technical employees at minority-serving institutions (MSIs) to teach computer science classes (Washington et al., 2015, 2017; Cain et al., 2018). After more than five years embedded at a few of these institutions, Silicon Valley reports that HBCU students do not have the skills necessary to perform well in tech (Baker et al., 2015). Tech companies often state that candidates for employment must have a mix of coding skills and fit for the company culture. HBCU students want to work for well-known companies like Facebook and Google; however, very few successfully pass the technical interview. Students are encouraged to interview in as early as their first-semester freshman year, and this may be their first experience with a tech employee. HBCU students often do not feel like they fit into the larger CS community and do not want to exhibit common stereotypes (i.e., laziness, inarticulate, and an inability to perform well) to tech employees during interviews. Students may not fully understand how to be successful in Silicon Valley. Silicon Valley reports that HBCU students do not have the skills necessary to perform well in tech (Baker et al., 2015). Companies like Google and Facebook have a diverse user-base; although the makers of these tools are overwhelmingly white and male (Cain et al, 2018). Google, Apple, and eBay increased their ratio of non-white employees by only 1% in 2016 (Cain et al, 2018). Tech companies are contributing to the wealth gap that is growing in the U.S. Not enough minorities, and women are graduating with technical degrees to work in Silicon Valley (Martin, 2014; Baker et al, 2015) and not enough of these students are passing the technical interview. Howard-West is an academic-industry partnership endorsed by the University Board of Trustees and President. The Howard-West project is led by a team of faculty from computer science, information systems, education, sociology, and psychology. Results from the Howard-West immersion project will be disseminated in these fields.

Research Implementation

This project will study if immersion of Howard University undergraduate computer science and information systems students in Silicon Valley will increase student performance in computing classes and lead to better success at obtaining and retaining jobs in Silicon Valley. This project will develop a pedagogy that embodies the innovative spirit of the "fail-fast, fail-often, recover-quickly" Silicon Valley environment. The project will create evidence-based learning experiences through tech employees and HBCU faculty mentoring and providing role models to Howard students. The use of Just-In-Time learning immerses students in Silicon Valley projects, problems, and culture, and measures the impact of immersion on student's feelings of imposter syndrome, self-efficacy, job readiness, stereotype threat, self-regulation, and co-regulation in learning. A positive side-effect of this research will also help to study the impacts of immersion on HBCU faculty and partnerships that are created from academic and industry instructors that participate in Howard-West. Outcomes of Howard-West project will include curriculum development, co-teaching, and engaging about the presence, or lackthereof, of stereotypes encountered by within this environment. Moreover, and central to the focal points of this research, is to study the influence of Howard-West/Tech Exchange and the outcomes of student learning and engagement. Furthermore, which mechanisms have students used to cope with barriers that would otherwise influence IT degree pursuit, which can lead to more nuanced means by which to recruit, attract, and retain Black students in the IT workforce. This research seeks to increase the number underrepresented minority students in Silicon Valley by 1) providing learning activities that immerse students in Silicon Valley projects, problems, and culture and 2) help students develop their problem-solving and coding skills. This work will inform the computer science faculty of new pedagogy using immersive learning. This research will also seek to create a bridge curriculum based on the outcomes of the pilot iteration of the Howard-West program that would assist student's preparedness for immersion into a Silicon Valley, fast-paced learning environment. This curriculum would be available to computing students and offered online such that students can participate as their schedules allow. This project will 1) implement innovative curriculum in classes co-taught with Silicon Valley professionals and 2) evaluate this curriculum according to the following metrics: improvement in students that pass the technical interview, student performance in classes, internship offers, and full-time job offers, student retention. Negative emotions like imposter syndrome and stereotype threat may be exhibited in technical interviews by HBCU students. This work seeks to study if the immersion of Howard-West students impacts feelings of imposter syndrome and stereotype threat.

Corporations will benefit from this study by increasing the number of minority candidates, reducing corporate culture stressors, and building interpersonal relationships with the future workforce. This study supports the need for business firms to create and nurture diversity programs to increase the number of qualified minority candidates. Intern, The value of creating a partnership with HBCU will assist with businesses in understanding how culturally diversity and inclusion will assist in cultivating decisions and innovations which marries the company's mission and direction. This study provides a comprehensive approach to developing relationships with students and potentially lower the apprehension of students that have the ability and fortitude to be successful in a business setting. In order to reduce the underrepresentation of minorities, a corporation must develop a vertical integration with immersive programs at HBCU's computer sciences and information technology departments.

Addressing the issue of diversity in Silicon Valley, and tech as whole will not have a "silver bullet" solution. It requires the cooperation of institutions of higher education and organizations which value technology to create a paradigm shift around inclusion. Minority and Black students are eager to demonstrate their aptitude for technology careers, and it is the job of those who are committed to the growth of technology and innovation, to provide the appropriate partnerships, opportunities, and resources. This research will provide an initial inquiry into understanding the following research questions:

- What experiences have shaped your outlook on choosing a major in technology?
- What experiences have shaped your outlook in selecting a career with a technology organization or in a technical capacity?
- What is your view on the tech industry as an inclusive workplace?
- Do partnership between Universities and tech firms lead to different outcomes from an educational and/or career perspective or students?

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