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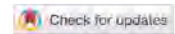
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Introduction

In the Information Technology (IT) and Information Systems (IS) communities, much of the work-force development research focuses on the IT artifact's role. However, another crucial lens for addressing diversity, equity, and inclusion focuses on the people who make the IT artifact. According to the United States Equal Employment Opportunity Commission (EEOC), in the overall private industry in 2014, the high-tech sector recruited a considerable number of Whites (68.5% in tech vs. 63.5% in the private sector) but it recruited a smaller number of Blacks (7.4% in tech vs. 14.4% in the private sector) (EEOC, 2014).

The high-tech sector has become a significant resource of financial growth, fueling the US economy and other top economies worldwide. This industry has impacted how we interact with and access information, disperse products or services and address critical societal problems. Because this market is the resource of a rising variety of tasks, the EEOC and its stakeholders must understand the emerging trends in this sector. Ensuring an adequate supply of workers with the proper skills and credentials and attending to the absence of diversity amongst high-tech employees has become a public policy concern (EEOC, 2014).

Jobs in computer science and engineering fields are expanding at two times the nationwide average (Richards & Terkanian, 2013). These jobs often provide greater pay and have been more resilient to financial recessions than various other economic sector industries over the past decade. Also, jobs in the advanced sector have a solid potential for growth. This work is necessary to firms in all industries that require workers with innovation abilities. Employment trends in the high-tech industry are, as a result, essential to the national economy and work expectations. These industries and what classifies as "high-tech" are swiftly developing. There is no solitary high-tech industry; rather, new technology has transformed sectors beyond IT and telecoms to products and features of numerous occupations.

Diversity? What Diversity!

According to the EEOC, 88% of tech executives in the United States are White. White people are continually represented at a higher rate in the tech sector's executive category than in the rest of the private sector at 83%. At the same time, Blacks have a 2% to 5.3% representation in the tech executive category. Whites account for more than 50% of employees at Apple and Google. In November 2017, Apple's most recent diversity report was released, and while underrepresented people employed at the company grew from 19% in 2014 to 23% in 2017, it is unclear if the increase is due to employment at the Apple retail stores or Apple's corporate positions. Even though Apple claims that its new employees in the United States were 50% historically underrepresented groups in tech, the significant statistics from the report for all employees at Apple are as follows: 21% of Apple employees are Asian, 9% are Black, 13% are Hispanic, and 3% are multiracial, while 54% are White.

Similar results were discovered in Google's diversity report. In 2016, Black men made up 3% of all new employees. Google's overall workforce statistics were: 54% White, 35% Asian, 4% Hispanic, and 2% Black. If these statistics were not daunting enough, Blacks have been noted to leave tech jobs because of unfair treatment, and turnover costs companies more than 16 USD billion each year. According to a 2017 study from the Kapor Center for Social Impact, unfair treatment of Blacks in the workplace is the most significant influencer of turnover in the US tech industry, costing companies

excessively in employee replacement costs. More than 37% of Blacks left tech due to unfairness and mistreatment (Scott, Klein, & Onovakpuri, 2017). The Kapor study also discovered that 35% claimed to seek a better opportunity, 25% were dissatisfied with the work environment, 22% were being recruited away, and 19% were dissatisfied with their job duties (Scott et al., 2017).

Implementation of diversity efforts could fetch the IT industry an extra 400 USD billion as revenue per year; this is according to CompTIA CEO Todd Thibodeaux. While making a keynote address at CompTIA's Channel in 2017, Thibodeaux (2017) said, "Financially, a one percentage point move toward representative diversity leads to a three-point increase in revenue. Companies in the top quartile for ethnic and gender diversity are more likely to surpass industry norms for revenue and operating margin. Companies in the bottom quartile for diversity aren't just lagging; they are rapidly losing ground."

The current societal climate can be described as one heavily characterized by diversity issues, especially due to the Black Lives Matter and racial justice protests that prevailed in the country following the May 2020 extrajudicial killing of George Floyd by police in the United States. This has, in turn, promoted the issue of diversity in the tech industry.

The number of computer science graduates from minority backgrounds remains stagnantly below 10% of total graduates in the United States. It has also been challenging for Blacks to make substantial progress in the tech industry due to high attrition rates for Black employees. Certain factors have contributed greatly to the underrepresentation of Blacks in the tech industry, such as a lack of senior sponsorship and effective mentoring, alongside inefficient hiring processes.

While we understand that the technology industry pays amongst the highest wages in the nation, the sad truth is that your location, race, and sex – not skills and experience – will often determine just how much you take home ("State of salaries report." Hired, 2018, hired.com/state-of-salaries-2018). Previous research released confirmed that there are open inequalities in pay based upon race. The report from Hired, which analyzed over 400,000 interview demands, suggests that, generally, Black technology employees are paid the least at 130,000 USD per year on the average, as much as 6,000 USD less than their typical White equivalents. Hispanic tech employees earn roughly 131,000, USD and Asian candidates make 133,000. USD Hired also found that White tech employees typically ask for a wage in the 130,000 USD range, but their salaries are found to be 6,000 USD greater. Compounding the issue is the fact that salaries for tech workers who are over 45 begin to decrease until retirement (Hired, 2018). Based on 9,000 confidential salary documents in jobs that paid over 150,000 USD for employees of all experience types and education degrees, Black tech workers made the least in every managerial and director-level workgroup, while Asians/Pacific Islanders gained one of the most (Hired, 2018). Also, men earn more than women in every job role except Supervisor of Engineering, where they tied at 175,000. USD

Perspectives

The perspectives presented below are from Black people in the tech industry. The quotes are compiled from various interviews, podcasts, and websites.

Nick Caldwell is the Vice President of Engineering at Twitter, a position he began in June 2020. He had previously held senior positions at Microsoft, Reddit, and Google after it acquired the business intelligence firm Looker, where Nick was the chief product and engineering officer.

Nick grew up in a Black neighborhood in Maryland. He finished from MIT in 2003, where he bagged a degree in computer science and electrical engineering, with a specialty in the nascent scope of machine learning. He started his career with Microsoft, where he worked with the speech and natural language group as an intern and later worked as a software development engineer. He developed an interest in computers from a very young age. He learned coding early also, according to InfoWorld (Carey, 2020).

Nick (2021) said, “Blacks have great confidence in their capabilities and talent because that will be required to go far in the tech industry.” He also advised young Blacks to value the importance of networking and appreciate the ever-developing knowledge of the tech business. He said, “The code you create as an engineer is a depreciating asset, but your network is an appreciating asset.” He exhorted the tech industry to become more welcoming toward diverse perspectives and be more inclusive to attract more diverse talents.

He also advised the industry to look beyond employing only recruits who are traditional four-year college graduates for entry-level positions, saying that “new funnels of talents” should be explored. These candidates should then be supported with mentorship, sponsorship, and apprenticeship programs to eliminate churn. He recommended that goals associated with diversity and inclusion should be tied to executive leadership incentives to achieve remarkable and effective changes. He encouraged Blacks in top positions in the tech industry to offer mentorship programs for young Blacks. Using himself as an example, he advised young Blacks to be very visible, as this helped him reach his current role.

Anjuan Simmons is the author of “Minority Tech” and also an engineering coach at Help Scout. He grew up in Texas, where he formally learned how to code at the University of Texas at Austin and attended Texas A&M University. Simmons benefited from a high school program looking for young Blacks who wanted to become engineers. After getting an engineering degree, he got a job in 1997 in a consulting firm within the technology practice in Houston, where he met one of the founding partners who was a Black and who genuinely motivated him. He recounted experiences of being overlooked as a team lead by clients because he was Black. He described this experience as being due to Blacks not being well-represented as leaders in the tech industry and not necessarily due to overt racist actions.

Anjuan emphasized the importance of Blacks having role models in the tech industry. He therefore implored the top Black executives to mentor and role model young Blacks. He also recommends networking as a way for Blacks to excel in tech. He specifically recommended the use of Twitter as an excellent resource that young Blacks will need, saying Twitter will make it easier to locate talented people of similar minds. He postulated that the United States tech industry sincerely wants to be open and inclusive, but the executives in the sector do not understand how to go about it. He said many of them could not relate to the experiences of Black men.

Simmons (2021) believes in tangible actions being taken to decrease Blacks’ underrepresentation in tech and acknowledged the increased discussion about diversity and inclusion. In his book “Lending Privilege,” dedicated to Blacks hoping to make it in the tech industry, he explained that “Diversity can be a numbers game, but inclusion requires empathy. Corporations are not designed to be inclusive; they exist to deliver value to shareholders. . . . HR departments aren’t going to help make our industry more inclusive.” Steps must be taken to define diversity at the organization and expand hiring pools, and White team leads should serve as advocates and lend their privilege where possible. He advised young Blacks hoping to venture into the tech world to enhance their expertise, market themselves, understand and use personal branding, and seek investors who are mentors and sponsors.

Valerie Phoenix works as a senior software engineer in a logistics software startup named Mastery Logistics System. She is also the founder of Tech by Choice, which is a firm aimed at boosting diversity in the science, tech, engineering, and math sectors by providing low- to no-cost skill-building events and virtual gatherings. She studied psychology and art at California State University at Northridge, where she worked part-time in data entry and customer support at Estify, a small startup based in Los Angeles. At the startup, she developed an interest in the engineering part of the business. After spotting a huge career opportunity in software development, she started learning how to code in HTML and CSS in her free time. Her front-end development skills increased, and her role changed to that of an engineer in Estify. This brought about some hostility toward her as she was one of the few women and the only Black person working there. She did not allow this to deter her, but instead, polished her skills more and

learned quickly. She then landed an engineering role at Zenith Insurance, where she was once more the only Black and one of the few young people on staff.

Valerie Phoenix (2021) advised young Blacks to pick one programming language, focus on it, and master it before moving on to the next. She also urged Blacks to know when to leave a company, stating that when a company assigns tasks that do not make one ready for the market, it is time to search elsewhere. She commends companies that have embraced inclusion and diversity but advised them to pay their underrepresented staff members well, establish appropriate policies, and not just enact performative allyship, which she said is not helpful. She also recommended management incentives alongside employment and retention of diverse talents into tech organizations, and implored tech experts to create time to push underrepresented Blacks, as this is the only way retention can increase for them. She also appealed to policymakers to formulate laws and policies that will make tech diverse.

Theoretical Lenses

From a research perspective, several theoretical frameworks can be applied to analyzing underrepresentation in IT. In the mid-2000s, there was a discussion about the causes of minority student participation in STEM fields. One line of inquiry was that minority students were “mismatched” with universities where STEM courses were too rigorous. This line of thinking was considered the “deficit” framework. The deficit models highlighted social programs, such as affirmative action, as mechanisms for allowing students’ admission into programs for which they were not qualified. By focusing almost entirely on empirical data, these types of deficit-centered approaches highlight student failure rather than student success.

The anti-deficit framework is in direct opposition to the deficit framework’s thinking. Harper (2012; 2010; 2009; 2006), Harper & Harris (2012)) created an anti-deficit achievement framework to discover more about Black men who were able to successfully navigate their way through the STEM post-secondary pipeline. The framework sought to redress the line of inquiry about minority students in STEM to focus on success factors (Harper & Nichols, 2008). Some of the affirming questions were: What stimulates and sustains students’ interest in attaining STEM fields? How do STEM achievers from low-resource high schools transcend academic under-preparedness and previous educational disadvantage? What compels students of color to persist in STEM fields, despite academic challenges and under-representation of same-race peers and faculty?

Social Cognitive Career Theory (SCCT) is concerned with foretelling and describing two main aspects of performance: the level of success that humans reach in educational and occupational pursuits and the extent to which they persist in the face of obstacles. SCCT focuses on the effect of ability, outcome expectancy, self-efficacy, outcome expectations, and performance goals on success and persistence. Ability affects performance and achievement in two main ways. First, it affects performance and persistence directly (Locke, 1987). Second, it also indirectly influences performance and persistence via the correlating scope of self-efficacy and outcome expectations. According to Bandura (1997), self-efficacy is the belief in one’s capabilities to succeed in a particular situation and having a high self-efficacy may lead people to set challenging but achievable performance goals.

The Individual Differences Theory of Gender and IT has been used to explain women’s underrepresentation in IT in various settings (Kvasny, Trauth, & Morgan, 2009; Trauth, Quesenberry, & Huang, 2008; Trauth, Quesenberry, & Yeo, 2008). The theory utilizes socio-cultural phenomena to explain differences and suggests alternative reasons to essentialism and social construction, such as variation within the same gender, for women’s low participation in technology. The Individual Differences Theory of Gender and IT has also been applied to Black men in IT disciplines (Cain & Trauth, 2015, 2016, 2017). The theory consists of three major constructs to explain gender variation in participation in the IT field: i) individual identity, ii) individual influences, and iii) environmental influences (Trauth, Cain, Joshi, Kvasny & Booth, 2016; Morgan, 2008; Quesenberry, 2007). The

individual identity construct consists of two sub-constructs: personal demographics (e.g., ethnicity, socio-economic class, family background) and career items (i.e., type of IT work). The second construct, individual influences, consists of two sub-constructs: personal characteristics (e.g., educational background, personality traits) and personal influences (e.g., mentors, role models, and significant others). Lastly, the environmental influences construct consists of four sub-constructs related to the geographic region; cultural influences, economic influences (e.g., cost of living, cost of education), policy influences, and infrastructure influences (e.g., institutional climate) (Trauth et.al, 2016).

A critical level of discourse in the United States is the debate between collectivist and individualistic theoretical approaches as they relate to behavior of people (Amaram, 2007; Fitzgerald, 2010). The Individual Differences Theory of Gender and IT allows for both group level and individual levels of analysis. It is within the Individual Identity and Individual Influences constructs where individual agency constructs and themes are most likely to be present. Conversely, it is within the environmental influences construct where group levels of analysis represent aspects of collectivism and where the group can establish agency rather than the individual (Amaram, 2007; Healy, Bradley, & Mukherjee, 2004; Triandis, McCusker, & Hui, 1990). As such, the theory posits that people simultaneously possess individualistic and collectivist characteristics, and are neither self-centered nor altruistic, thus the characteristics need not be mutually exclusive.

Conclusion

There are avenues to study computing, informatics, and engineering in the United States without positioning the research focus mainly on the IT artifact. Instead, we can target a person or a group as the artifact and a meaningful career in IT as the outcome. We have diversity, equity, and inclusion issues in technology. Many Black people who enter IT leave the profession due to hostility and mistreatment at the workplace and other reasons such as pay discrepancies and a lack of mentorship. An exploratory analysis of prominent Black people in technology highlights the fact that roadblocks and barriers exist at all levels. Recommendations include increased management incentives toward diversity and inclusion, increased pay for minority groups, empathy toward newly employed people, and mentorship of Blacks. An important way to address underrepresentation is for policymakers and tech companies to formulate policies that will make it easier for recruitment and retention of Black tech talent and for the research community to engage and encourage diversity research. Dr. Claudia Rankins, National Science Foundation Program Director (Retired), and Hampton University-trained physicist may have said it best: “There is only one reason we should seek diversity in our organizations, societies, workplaces, schools: it is the socially just and moral thing to do. Talking about how diversity ensures a large enough workforce and makes for better outcomes is self-serving at best.” And yet, here is an entire essay dedicated to that goal because it would appear that we need to continuously cloak equality, diversity, and inclusion as anything other than being morally correct.

Notes on contributor

Curtis C. Cain, Ph.D., is an Assistant Professor at Howard University’s School of Business (Department of Information Systems and Supply Chain Management) and Affiliate Professor of Computer Science in the College of Architecture and Engineering. His research interests over the last 12 years are in computer science education and broadening participation in computing. Specifically, he studies Black people’s pathway into computing and engineering to analyze roadblocks and barriers to entry and sustained success in the field. He has taught several classes at Howard University, as well as Software Engineering on Google’s main campus in Silicon Valley. He received his Ph.D. from the College of Information Sciences and Technology (IST) at Pennsylvania State University. He received his Master of Science in Computer Science and Software Engineering from Auburn University. He is the recipient of the prestigious National Science Foundation CAREER award, has secured NSA funding to increase capacity in cybersecurity, and is an Institute for Citizens & Scholars Excellence in Teaching Fellow.

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