

# **WILL MORE TECHNOLOGY IN ACCOUNTING BECOME ANOTHER BARRIER TO ATTRACTING AND RETAINING BLACK STUDENTS TO THE PROFESSION?**

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**ABSTRACT**

*Automation in the form of drones, machine learning, computer vision, robotic process automation, artificial intelligence, and robotic software applications will continue to increase productivity and reduce the need for some workers. While there may not be an immediate reduction in accounting professionals, data analytics has begun to shift the primary skill sets needed for accountants in the United States and abroad. In this paper, we identify and discuss the main challenges the profession faces in attracting black students to the profession. Additionally, we present a theoretical discussion of the challenge of ensuring that as more accounting work moves from traditional functions to those more akin to information systems professionals, we do not lose black students in the major and profession. We discuss how data analytics could reduce interest in the career among some demographic groups who historically have shown a hesitancy to pursue information technology careers. We conclude with a summary discussion of strategic recommendations that may allow the profession to increase its attractiveness with black students so that the accounting field may continue to enjoy a healthy number of new skilled recruits in the United States to replace retiring accounting and financial professionals.*

Keywords: AIS, Accounting Education, Automation, Data Analytics, Big Data, Diversity, Accounting Recruitment

## INTRODUCTION

In his 1959 dissertation, Melvin Edwards defined automation as “the continuous and integrated operation of data processing through the use of automatic machines.” He described accounting as “the recording, classifying, summarizing, and interpreting of data of a financial character.” At that time, automation in accounting took the form of duplication of documents using carbon paper rather than manually recreating them, adding machines and calculators, punch card tabulating systems, and computers that read punch cards. It was known then that automation would reduce the amount of time and labor necessary to complete specific business tasks (Edwards, 1959). In the 1950s, apprehension, and fear developed among employees in fields related to accounting. While computers were quite expensive, business executives considered the costs of installation or rental fees compared with the salaries of the personnel whom the computer would replace. The computer's cost was likely to be higher for smaller companies than human workers' cost, while it may have been more cost-effective for larger organizations (Keenoy, 1958). In 1966, George Mitchell predicted that check usage would disappear. The settlement and deposit accounting process would be carried on concurrently at and between 250 or so computer centers located throughout the country using machine language (Mitchell, 1966).

Today, digital technology and automation touch almost every business aspect (Bhimani & Willcocks, 2014). In the era of Big Data, accounting tools are swiftly changing to respond to digital technologies' capabilities and opportunities. More accountants now need to maintain expertise in the ever-changing accounting landscape of GAAP, GAAS, and the plethora of

traditional accounting proficiencies; however, there is also a need for those who work with large amounts of data to possess the ability to acquire data, mine data, and structure data as a part of robust analysis. In addition to traditional accounting knowledge, accountants, like other professionals who work with data, need IT proficiency (Davenport et al., 2012).

This paper does not aim to provide a detailed discussion of the various accounting curriculum changes suggested in previous works. We leave that to other researchers. Pincus et al. (2017), Sledgianowski (2016), Spiceland et al. (2015), Morris et al. (2015) are just a few of many who have tackled this topic. Instead, we focus on how these changes may expose the profession to less diversity if not handled correctly and propose strategies to reduce this risk.

We organize the remainder of this paper as follows; first, we present employment trends highlighting how technology is projected to reduce employment in certain occupations and substantially change others. Second, we discuss how technology is forecasted to continue to disrupt the accounting field and how the profession must address the challenges of both skill gaps and increasing worker diversity to adapt. Next, we discuss the ongoing under-representation of black students in accounting and IT majors and what this means for a rapidly changing accounting profession that will rely more on technology skills and AIS literacy. Lastly, we conclude with possible strategies for retaining and increasing black students in colleges and university accounting programs and bridging the skills gap for them, thereby warding off a potential shortage of accountants with the profession's needed IT literacy. Much has been written about the trend of technology in the accounting profession. Our contribution to the literature is to investigate how these shifts threaten the recruitment and retention of Black students.

## **AUTOMATION EMPLOYMENT TRENDS**

Employment in middle-skill occupations, those that require specialization in routine labor tasks, has declined significantly in the United States during the last 30 years due to automation and offshoring overseas. Middle-skill occupations typically consist of blue-collar manufacturing jobs associated with assembly and machine operation and white-collar occupations that involve routine office and administrative duties. In both cases, these occupations focus on executing a routine that can be easily broken down into a set of smaller tasks. Tasks that a computer could be programmed to complete (Mandelman, 2017).

Such employment declines have not occurred for occupations that employ high-skill workers and low-skill workers. High-skill workers can include accountants who execute non-routine cognitive tasks and are not at risk of automation because they generally require creativity, managerial skills, and flexibility, but this does not prevent them from the risk of being sent overseas (Mandelman, 2017). Low-skill jobs are sheltered from automation and offshoring for several reasons. Jobs such as babysitting, bartending, and those involving non-medical in-home care for the elderly require dealing with unpredictable human behavior. Other low-skill jobs, including home and office cleaners, gardeners, and construction laborers, require careful manual handling and cannot yet be automated or sent offshore.

In summary, low and high skill jobs have a lower risk of automation than middle-skill jobs. Table 1 provides data on the jobs in the United States that employ the most people and have a high risk of automation. The majority of these jobs are middle-skill occupations requiring routine tasks.

Table 1. Ten Jobs at High Risk of Automation that Employ the Most Americans, by Race

	Occupation	Total Employed	% Employed	% of White Workforce	% of Black Workforce	% of Asian Workforce	% of Hispanic Workforce	Automation Risk Score
1	Cashiers	3,164,000	2.01%	1.79%	2.92%	2.26%	2.75%	0.97
2	Retail salespersons	3,105,000	1.97%	2.00%	1.99%	1.36%	2.09%	0.92
3	Secretaries and administrative assistants	2,688,000	1.71%	1.87%	1.21%	0.92%	1.30%	0.96
4	Laborers and freight, stock, and material movers	2,235,000	1.42%	1.32%	2.28%	0.59%	1.86%	0.85
5	Construction laborers	2,051,000	1.30%	1.43%	0.91%	0.32%	3.45%	0.88
6	Waiters and waitresses	2,038,000	1.29%	1.26%	1.17%	1.51%	1.72%	0.94
7	Cooks	2,031,000	1.29%	1.17%	1.90%	1.23%	2.69%	0.81
8	Accountants and auditors	1,964,000	1.25%	1.24%	0.86%	2.30%	0.63%	0.94
9	Office clerks, general	1,355,000	0.86%	0.82%	0.95%	1.14%	1.02%	0.96
10	Receptionists and information clerks	1,288,000	0.82%	0.80%	1.02%	0.58%	1.01%	0.96
11	Sales representatives, wholesale and manufacturing	1,281,000	0.81%	0.93%	0.39%	0.49%	0.50%	0.85
12	Grounds maintenance workers	1,273,000	0.81%	0.89%	0.54%	0.11%	2.00%	0.95
13	Production workers, all other	1,141,000	0.72%	0.69%	0.95%	0.64%	1.01%	0.92
14	Real estate brokers and sales agents	1,095,000	0.70%	0.76%	0.45%	0.56%	0.42%	0.915
15	Food preparation workers	1,079,000	0.68%	0.65%	0.74%	0.87%	1.09%	0.87
16	Bookkeeping, accounting, and auditing clerks	1,015,000	0.64%	0.71%	0.36%	0.54%	0.48%	0.98
17	Miscellaneous agricultural workers	866,000	0.55%	0.65%	0.12%	0.10%	1.69%	0.87
18	Inspectors, testers, sorters, samplers, and weighers	802,000	0.51%	0.51%	0.48%	0.42%	0.51%	0.98
19	Taxi drivers and chauffeurs	790,000	0.50%	0.36%	1.20%	1.01%	0.67%	0.89
20	Property, real estate, and community association managers	780,000	0.50%	0.53%	0.36%	0.34%	0.36%	0.81
21	Insurance sales agents	595,000	0.38%	0.39%	0.31%	0.33%	0.29%	0.92
22	Industrial truck and tractor operators	571,000	0.36%	0.32%	0.76%	0.09%	0.65%	0.93
23	Billing and posting clerks	459,000	0.29%	0.31%	0.24%	0.21%	0.26%	0.96
24	Paralegals and legal assistants	444,000	0.28%	0.28%	0.27%	0.29%	0.28%	0.94
25	Couriers and messengers	402,000	0.26%	0.24%	0.36%	0.17%	0.31%	0.94
26	Operating engineers and other construction equipment operators	375,000	0.24%	0.26%	0.17%	0.03%	0.20%	0.95
27	Combined food preparation and serving workers, including fast food	372,000	0.24%	0.21%	0.38%	0.20%	0.27%	0.92
28	First-line supervisors of housekeeping and janitorial workers	352,000	0.22%	0.23%	0.27%	0.11%	0.35%	0.94
29	Dining room and cafeteria attendants and bartender helpers	338,000	0.21%	0.21%	0.22%	0.20%	0.42%	0.91
30	Hosts and hostesses, restaurant, lounge, and coffee shop	322,000	0.20%	0.20%	0.14%	0.13%	0.21%	0.97
	Total/Average	36,271,000	23.02%	23.03%	23.91%	19.05%	30.50%	92.02%

Source: US Bureau of Labor Statistics (BLS), 2020; Frey and Osborne (2017). Note: This table reflects data for a subset of the 220 occupations for which the BLS provides gender and race statistics and for which Frey and Osborne (2017) provide an automation risk score.

The accounting and auditing fields have an automation risk score of .94. Employment in the field accounts for .86 percent of the Black workforce compared with .63 percent for Latinos, 1.24 percent for whites, and 2.3 percent for Asian Americans. According to the Bureau of Labor Statistics, accountant's and auditors' employment is projected to grow 10 percent between 2016 and 2026, faster than the average for all occupations. With falling prices of computing and automation technology and increased efficiency, fewer workers are needed to perform middle-skill, routine accounting job functions. However, growth is expected in high-skill accounting areas that involve problem-solving skills, cognitive ability, and interpersonal communication. This growth is linked to increased globalization, economic development, and a complex tax and regulatory environment that will require complex skills, cognitive ability, and familiarity with automated accounting programs. We are currently experiencing an "automation industrial revolution," which entails the automation of a number of jobs and the use of artificial intelligence (McGinnis 2020). A study by the McKinsey Global Institute (Manyika et al., 2017) estimated that accelerated automation could raise productivity growth significantly and replace half of today's work activities by 2055. More recently, the Covid-19 pandemic, because of social distancing requirements and quarantines, increased the speed at which job automation is taking place. Broady et al. (2021) find that resulting increases in unemployment have disproportionately impacted Black and Latino workers.

## **THE GROWTH OF TECHNOLOGY IN ACCOUNTING**

While much accounting work is high-skill tasks, many accounting jobs can be categorized as middle-skill. In financial and management accounting, these include such skills as repetitive journal entries, updating accounting records, and generating invoices and financial

statements. For example, new tools, like Robotic Process Automation (RPA), can perform routine accounting work comprised of manual steps and keystrokes. RPA and similar programs combine these actions into a single, smoothly automated process (Vasarhelyi and Rozario, 2018). RPA technology results in cost saving by reducing the necessary number of human workers while also reducing task processing time (Fernandez and Aman, 2018). Fernandez and Aman (2018) also found that while RPA technology could help solve disciplinary problems, worker productivity, and human resource shortages, tasks involving higher-level aspects of work such as analytical thinking and processing could not be completely automated. RPA can be used in other accounting applications such as a significant portion of tax activities, including calculating book-tax differences and preparing tax returns. However, it has not yet been widely used for auditing services due to audit services' highly regulated nature (Vasarhelyi and Rozario, 2018). Auditing is already using Big Data in powerful ways, as it involves the functions of quantitative work. However, it requires a high degree of human interaction, including judging human behavior.

RPA type software can be applied to multiple processes simultaneously, including accounts payable, accounts receivable, financial close, controller work, financial planning, expense management, and tax. Unlike human workers, RPA has no working hour limitations and can run twenty-four hours per day, seven days per week, 365 days a year, thereby increasing productivity. RPA tools' ability to complete routine, slow data entry tasks allow human workers to spend their time working on high-value projects (The Lab Consulting). However, human workers must have the education and skills necessary to complete these high-value tasks and at the same time monitor and manage the new tools. Data Analytics also allows companies real-time access to more and new types of information via technology. Accounting is a critical area



within organizations that significantly interacts with this technology, thereby requiring accounting education changes.

The need for a change in the way accounting education prepares graduates for accounting practice needs has been discussed for at least the last three decades (Howieson, 2003; Albrecht and Sack, 2000, Pathways, 2012). While the field of accounting has changed over the years, with enhancements from automation and artificial intelligence, the way accounting is taught at most United States colleges, and universities has remained essentially unchanged. The result is a skills gap between accounting graduates and accounting organizational requirements (Pincus et al., 2017). Most accounting graduates are required to have taken at least one course in Accounting Information Systems; however, stakeholders of the profession, which include accounting firms and professional certification bodies, recommend that Big Data, technology, data analytics, and information systems be integrated into all accounting courses to provide students with the necessary skills and knowledge to adapt to the data-centric environment (Sledgianowski, 2016). We are entering an environment where information and technological literacy are as crucial as accounting knowledge. The current generation of students must be able to learn the traditional accounting curriculum but must also be educated in a way that encourages overall technology literacy and the soft skills needed to communicate this knowledge (R. de Villiers, 2010).

Hood (2015) interviewed accounting leaders to determine what they perceived as the significant risks to the accounting profession. He groups these risks into what he calls the three biggest “accounting nightmares.” His three biggest nightmares: based on these interviews are (1) technology changes that will make many traditional accounting jobs obsolete, (2) making sure students and those already in the profession possess the right mix of skills necessary for the

new requirements of the profession, and (3) keeping up with the pace of technology changes. These accounting leaders also further mentioned the risk of offshoring some accounting jobs and automating many others. One indication of the increasing accounting skills gap for available jobs and student preparedness is a 4% increase of hires in audit-related services but an approximate 30% decline in hiring of new accounting graduates. Recent accounting firm hiring indicates a demand for different competencies. Accounting graduates are still being hired, but firms are seeking other skill sets as well. There is an indication that the current gap in skills related to technology needs is being met with non-accounting graduates (AICPA 2019).

### **Technology, Accounting and the Underrepresentation of Black Students**

The need to equip all students with sufficient technology literacy, accounting theory, and soft skills can be a difficult task. However, under-represented minority populations are at an even greater risk of not gaining and embracing technological literacy sufficient to fill the horizon's skills gap. Without specific and sincere efforts to reduce this risk, there will be less diversity in the accounting fields, and there may be a shortage of available skilled accountants. Moreover, the profession may lose the inherent value that a diverse workforce brings in the United States market.

Many factors contribute to the severe under-representation of black workers in information technology-related professions. Lack of access, level of math and science achievement, and emotional and social attitudes about computer capabilities are among the factors that cause women and minorities to avoid high-tech careers (Brown, 2001). Additionally, the lack of a sense of belonging contributes to students who leave STEM majors. Feelings of

cultural dissonance, not a lack of ability or interest, are the things that prompt students to leave undergraduate programs in STEM (Seymour & Hewitt, 2018).

There is a noted lack of black participation in the accounting profession compared to college graduates' rates. However, while the accounting profession was expected to grow by 16 percent between 2010 and 2020, Black student's applications to accounting programs at colleges and universities declined (Ross et al., 2014). Additionally, problematic for minority participation in accounting is the potentially harmful impact to the profession of the loss of diverse individuals entering and remaining in the profession. Minorities trail non-minorities in the rate of new hires into CPA firms and trail them at significant rates as they progress through accounting careers, as demonstrated by the decline in minorities in partner positions (Moore, 2013). The AICPA's [National Commission on Diversity and Inclusion](#) reported a declining trajectory of minorities in the accounting profession and announced a need to retain and advance minority accountants (Schiavone, 2013). The Trends in the Supply of Accounting Graduates and the Demand for Public Accounting Recruits Report (2015) lists the percentage of Black students graduating with a bachelor's or master's degree in accounting at just 5%, and the 2019 report lists this percentage at 6%. These percentages represent a relative decrease of 1%, since the percentage of Blacks in the US population has increased from 12.9 to 13.6%.

The demographic breakdown of Americans younger than 18 years old indicates that the American population's diversity will continue to increase. For example, in 2014, almost 50% of Americans under the age of 18 were people of color. For US residents between the ages of 18 and 24, 55 % were white, 15 % were black, 21 % were Hispanic, 5 % were Asian, 3 % were mixed race, and 1 % were American Indian/Alaska Native. Due to this increased diversity amongst young Americans, the Census Bureau projects that over 50% of Americans will be

people of color by 2050 (Colby and Ortman, 2015). As the country continues to become more diverse, the accounting profession will need to attract and retain diverse students and employees.

Further, The Pathways Commission on Accounting Higher Education (2012) maintained that the goal of diversity was a crucial one. In its list of seven recommendations for the profession, it suggests the following recommendation related to diversity:

*Objective 5.5: Encourage a separate and more focused study of the impediments to better diversity within the profession. “As previously noted in the introduction to this report, the challenges of improving the representation of currently underrepresented portions of our population within this profession are so significant as to warrant a separate study and proposals to better address this perplexing problem. Many of the past efforts by a multitude of interested groups and individuals have made a positive impact on this challenge, but collectively, these efforts have still fallen short of achieving representation within the profession in line with the diversity of the population as a whole. Based on current demographic trends in the United States, this challenge will surely become more difficult in the future. “*

The already dismal numbers of Black students entering the accounting profession and the implications of data analytics and technology on accounting curriculums and the profession could provide the perfect storm that results in further dwindling of Blacks entering and remaining in the profession. Unless the accounting profession addresses this risk for these diverse students and confronts the threat directly, the profession may find a shortage of accounting professionals to fill the need for high-skill accounting positions.

Strategic solutions must include an effort to maintain and increase the numbers of Black students in the accounting profession with strategic partnerships and programs; study the pedagogy of how we empower these students to perform successfully in technical subjects; and

determine how we create an infrastructure of inclusiveness at colleges, universities, and accounting firms.

## **STRATEGIC SOLUTIONS AND EDUCATIONAL INTERVENTION**

In the 1960s, business educators considered the possible effect of automation on established bookkeeping and accounting practices and its impact on high school instruction in these areas. It was believed that regardless of the extent to which automation would be used in accounting, students would continue to require an understanding of bookkeeping principles and methods. However, business educators questioned whether high school textbooks in bookkeeping and accounting provided sufficient data processing content (Linnaus, 1969).

Students in the 1960s were conscious of automation's impact on society, though few college and university business programs required courses or computer methodology training (Nielsen, 1965). This sort of disconnect exists today as it did in the 1960s. According to Wells (2018), accounting education contributes to the narrow and stereotypical scorekeeping perceptions students have of accounting. The study found a disconnect between accounting education and accounting practice and called on accounting textbook authors and publishers to provide additional focus on the broader context within which accounting operates and the influence of automation on accounting processes.

### **Strategies and Interventions**

To bridge the gap between accounting education and accounting practice and prepare students for technological advances in accounting, institutions must create innovative programs and partnerships. Some of these interventions will need to begin at the high school level. The National Association of Black Accountants “NABA” is a nonprofit membership association that

seeks to bring more black professionals into the accounting, finance, and related business professions. NABA has a membership of more than 200,000 black professionals in these fields and provides education, resources, and networking to professional and student members (nabainc.org). NABA supports business and accounting exposure to high school students through its Accounting Career Awareness Program (ACAP) program. The goal of ACAP is to increase the understanding of accounting and business career opportunities among high school students from underrepresented ethnic groups.

A 2020 study conducted by the College Board, and the National Science Foundation, indicates that students who take AP computer science in high school are three times more likely to major in computer science. These results are also consistent for women, Black students, and Hispanic students (College Board, 2020). While the goal for the accounting profession is not to create more computer science majors, this example suggests that early intervention and exposure to accounting and technology, such as AP courses and NABA's ACAP program are crucial to encouraging students to see themselves as having suitable technology skills to major in a technical major.

Another example is The National Academy Foundation, Academy of Finance, and the AICPA have partnered to expand high school student exposure to the accounting profession by hosting an annual "Bank On It" tournament. Bank On It is an online accounting game designed to teach high school and college students accounting fundamentals using real-world scenarios. Bank On It has completed over 100,000 games and hosted over 350 tournaments since its inception in 2015. The AICPA has developed a toolkit for historically black colleges and universities (HBCU). These toolkits are provided to campus career service centers to ensure that their students are prepared professionally, recruited, and receiving internship and job placement

opportunities. North Carolina A&T State University College of Business and Economics (NC A&T) is an HBCU located in Greensboro, NC. NC. A&T graduates more Black engineers and accountants than any other HBCU in America. Their “Closing Bell” Speaker Series began in September 2008 and is designed to bring successful scholarly professionals to campus to engage with students in topical discussions that reflect the changing global environment. Another HBCU, Howard University, has created the Howard Center for Accounting Education and has partnered with the AICPA to establish the "Pipeline Working Group" to develop initiatives that reach out to underrepresented minority students at high schools, community colleges, and universities. Programs and collaborations like these that help prepare accounting students to begin their careers or transition into higher-level occupations will be essential to the profession's future. The US Bureau of Labor Statistics has projected a 13% increase in the number of accounting jobs between 2012 and 2022; however, AICPA data show that combined Blacks and Hispanics hold just 4% of all partnerships in the profession. One way to improve these statistics is to make sure minority accounting students have mentors, and those mentors encourage more students of color to sit and pass the Uniform CPA Exam.

The college and university environments must encourage and support student organizations like NABA on campus, but in addition to organizations such as NABA, there are additional resources available to incentivize minority students to choose accounting as their career path. Scholarships can significantly influence an undergraduate's or graduate's decision when selecting a particular major. The AICPA’s Private Companies Practice Section selects ten ethnically diverse students to participate in an internship at a cosponsoring firm. It awards up to a \$10,000 scholarship per student to help with tuition for their final academic year. Additionally, the AICPA provides \$3,000 to \$5,000 scholarships for outstanding minority students to

encourage accounting as a major and fund the Fellowship for Minority Doctoral Students. The program's goal is to ensure that diverse CPAs are visible in classrooms. The fellowship has increased the number of minority CPAs who serve as role models in classrooms. For the 2018-2019 school year, the AICPA awarded scholarships totaling \$300,000.

### **Classroom Strategies and Pedagogy**

One strategy to increase students' confidence with technology appears to be by embracing and using technology in the classroom. In a survey of over 71,000 college students, women reported that they learn better in environments with more online components than men. Some speculation as to why this might be the case includes, overcoming the constraints of work and family, and preferring an online environment where they do not struggle to share their thoughts and ideas in a classroom dominated by men, who tend to exhibit more assertive behavior and dominate classroom discussion (Brooks, 2016). It is possible that the same may hold true for black students. Similarly, students-of-color, significantly more than their white peers, view technology as a tool that helps them to communicate and improve their perceived learning in the classroom. This may also be related to technology's ability to remove race from the equation during student discussions, thus placing the focus on what they are saying rather than the race of who is saying it.

Women, minorities, students with disabilities, first-generation students, independent students, and students from disadvantaged families see their personal computer devices (laptop, tablet, mobile phones) as considerably more critical to their learning outcomes than their peers. White students are significantly less likely than non-white students to think desktops, tablets, and smartphones are essential to their success (Galenek et al., 2018).



Instructor policies that ban or discourage mobile device use in the classroom may disproportionately impact minorities. Considering that these groups of students attribute high levels of importance to these devices for their academic success, instructors should set aside their concerns about using such devices in class. Research suggests that policies that ban and discourage student technology use in the classroom may very well disadvantage women, students-of-color, lower-income students, and students with disabilities in ways that lessen their achievement. Well-meaning instructors seek to prohibit certain technology use in the classroom to reduce distractions and increase learning. However, to discourage or ban these tools, especially laptops, strips these students of devices they report as essential to their education; this can be problematic for underrepresented populations (Galenek et al., 2018). It may be a better strategy to use these devices in meaningful ways that contribute to classroom learning and reduce time spent delivering class lectures. Furthermore, as more scholars research the Covid-19 effects on accounting education, we will hopefully better understand how the immediate and significant insertion of technology in the learning environment has helped or hindered students. Future research will hopefully review which types of pedagogy have had the most impact on a classroom's positive technology experience.

More can be done to use technology in the classroom to increase learning outcomes and technical literacy. For example, online tutoring has been shown to serve as a useful review tool for intermediate accounting students (Jackson and Cossitt, 2015). Other types of technology immersion may also increase the success of Black students. They may also increase the comfort level of technology use in a professional setting.

Ensuring students have significant support in the first two years of technical programs has been shown to increase outcomes for students studying technology-related subjects. Howard

University, an HBCU, and Google developed a residency program to increase technical support and tutoring for students. The program used software developers to serve as full-time faculty members in HBCU Computer Science departments where they teach Introduction to Computer Science and other courses. Additionally, they created a peer tutoring program that assists in the first three courses of study in the Computer Science major. The program targeted freshmen and sophomore students since the most risk of not retaining students are in the first two years of college. The program not only increased retention of freshman and sophomore students, but it also improved scores in the Introduction to Computer Science course and increased student preparation for upper-division computer science courses (Washington et al., 2015).

There is evidence that using slightly different instructional tools may help to reach black students. Pietre et al. (2021) found that using video to introduce material to black women produced better results than the same material was given in written form. When participants were shown a brief video of a black woman computer scientist, they felt a warmer connection with the scientist in the video versus those who only read about her. Most importantly, Black females who watched the computer scientist's video reported greater interest in computer science compared to those who only read about the computer scientist. Their findings suggest that videos are useful tools for creating positive feelings about technology careers and highlight the importance of representation in popular movies and TV shows (Pietre et al., 2021). Courses that employ video, especially those that feature Black accountants or computer specialists, can contribute to retaining Black students in computer-related classes

### **Campus Climate and Faculty Role Models**

Students need to see a reflection of themselves when deciding to choose a major. When deciding whether or not they belong in a technical field, it is crucial that students see others who

reflect themselves as a counterpoint to socialized assumptions about possibilities of success. If there are no people of the same race with which they identify, then they will also question if this is a space where they belong. Mentors, faculty, and practitioners who will work with students from their own culture helps to strengthen that identity (Collins, 2018).

Retention efforts that retain minority students on campus, including diversity initiatives, campus climate initiatives, and faculty diversity, may increase retention for all minority students, including those majoring in accounting. Hostile campus climates continue to affect minority students. Almost 50% of four-year college students have voiced concerns about racial diversity by organizing on campuses. Additionally, the racial climate on campus is a priority for more than half of four-year college presidents (Espinosa et al., 2016).

Ensuring that campuses employ a diverse and innovative faculty is often mentioned as a strategy to aid in retaining minority students. Diversity across all institution levels, including the institution's administration and faculty, can be an essential way to achieve a positive campus climate. Students report inclusiveness in the faculty create a sense of belonging and provide clear role models. Actual examples of this suggest that increasing the number of underrepresented groups among faculty may increase students' sense of academic validation. At Georgia State University, Black and Hispanic enrollment increased from 38 to 50 percent between 2001 and 2014. Graduation rates for Black students increased from 25 to 56 percent, and for Hispanic students, from 38 to 55 percent. During much of the same period, the percentage of non-white, full-time faculty increased from 15 to 24 percent between 2001 and 2011. At the University of Illinois at Chicago, Black and Hispanic enrollment increased from 26 to 34 percent between 2001 and 2014. Graduation rates for Black students increased from 27 to 43 percent, and for Hispanic students from 38 to 56 percent. Non-white, full-time faculty are

now 30 percent of the faculty, a noticeably higher percentage than at most universities (US Department of Education, 2016). While this does not provide conclusive evidence, it suggests that diversifying faculty matters and diversifying accounting faculty may provide a favorable advantage for attracting and retaining black students in accounting.

Li and Koedel (2017) argue that Black, Hispanic and female professors are underrepresented, while white and Asian professors are overrepresented across all disciplines. However, when reviewed in detail, almost all of that can be attributed to the underrepresentation of Black and Hispanic men and women and women of all backgrounds in the natural sciences, technology, engineering, and math. In a study done by Clauset, Arbesman, and Larremore (2015), placement data was analyzed on nearly 19,000 regular faculty in business, computer science, and history. They discovered that the placement of professors in higher education is a “steeply hierarchical structure that reflects profound social inequality.” That structure is self-replicating unless specific and deliberate action is taken to eliminate it. Simply put, universities recruit professors from a few selective and narrow Ph.D. programs. Those programs where the professors are recruited from also recruit from a limited and narrow base of students. Therefore, there will be limited opportunities for diversity unless this is confronted and changed.

## **CONCLUSION**

Technology will continue to change the accounting profession so that it looks less like the accounting of the past and looks more like managing technological processes. Historically, Black students have shown relatively low levels of interest in IT. This dynamic may put at risk future recruiting of accounting majors and retention in the profession. Students-of-color (specifically Black and Hispanic students) are already under-represented in accounting programs

and IT programs; consequently, Data Analytics tools may hurt these students' already low participation levels in the major and profession. As US demographics change and minority students make up a more significant proportion of available students, this is not sustainable. The profession needs all demographics' full participation to replace retiring financial professionals and ensure that our needed roles as strategic partners, analysts, and accounting experts are fulfilled. Suppose technology is used correctly in the classroom, and specific engagement of these students is continued and or established. In that case, technology has the possibility to increase Black professionals in accounting rather than impede it.

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