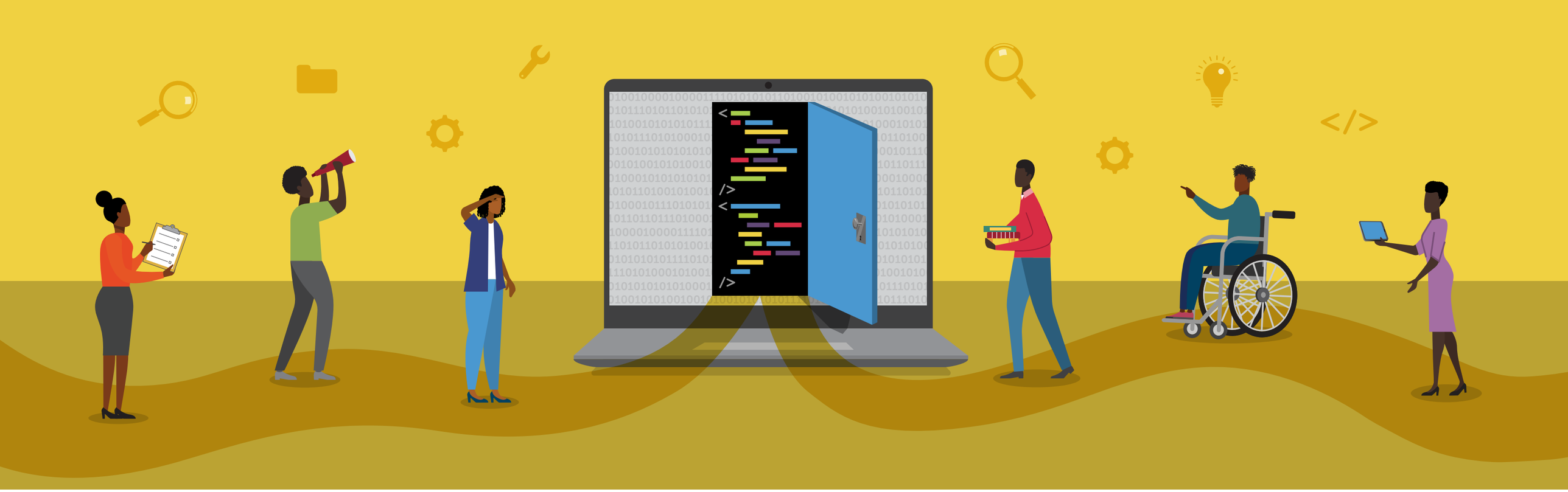

Understanding the Supports and Skills that Enable Successful Pathways for Black Learners and Workers into Non-Four-Year Degree Technology Careers: A Landscape Scan

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Digital Promise
Accelerating Innovation in Education

Walmart org

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Funding for this project is provided by Walmart through the Walmart.org Center for Racial Equity, established by Walmart and the Walmart Foundation's $100 million commitment over five years to advance racial equity in four U.S. societal systems: education, finance, health, and criminal justice. The center focuses on addressing systematic disparities experienced by Black and African American communities in the U.S.

About Digital Promise

Digital Promise is a nonprofit organization, created with a mission to accelerate innovation in education to improve opportunities to learn for all learners. We believe that each person at every stage of their lives should have access to inclusive, powerful learning experiences based in fact that affirm and honor all identities, perspectives, and cultures. Through these experiences, learners can acquire the knowledge and skills they need to thrive in an ever-changing world. Education is a civil right. Working at the intersection of education leaders, researchers, entrepreneurs, and developers, we bring together contributors from across the sector to improve learning and opportunities to learn with the power of technology and innovation. As such, this position confers us, our networks, and our partners with significant responsibility to influence systems, practices, and policies to ensure all learners the opportunity to achieve their highest human potential.

About the Adult Learning Initiative

The Adult Learning Initiative focuses on equity-centered research with historically and systematically excluded adult learners, exploring their skills, supports, and learning variability to achieve life-sustaining development and success. We bring together adult learners, researchers, learning providers, and industry partners to achieve the following:

- lead **equity-centered research** about skills-based recognition and the wraparound supports and services needed for adult learners to achieve success, inclusive of and relevant to adult learners and workers;
- expand equitable **access to digital skills**, literacies, tools, social capital, and credentials needed to attain economic and social mobility; and
- promote a **collective impact approach** to advance digital upskilling and learning opportunities.

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Executive Summary

While diversity within the technology industry has been critical for the development of strong and creative technology solutions (Joyce, 2022), the recruitment and retention of diverse tech talent in today's society has been a challenge worldwide (Fortinet, 2022), especially for Black learners and workers. Subsequently, the technology field is left lacking in diversity of thought and perspective among technology industry practitioners and leaders.

With the generous support of Walmart through the Walmart.org Center for Racial Equity, Digital Promise conducted a landscape analysis within the United States to understand the factors, skills, and supports most likely to 1) sustain motivation and persistence for Black learners and workers pursuing non-degree credentials in technology careers and 2) increase the representation of Black learners and workers across the technology learning and workforce ecosystem. By examining peer reviewed journal articles, statistical data from research reports, and website material from professional associations, this landscape scan provides a synthesis of existing research and a curation of programs, services, and supports that effectively promote the success of Black learners and workers within technology career pathways.

To help increase the representation and retention of Black learners and workers within the technology industry, this research highlights key findings, resources, and recommendations related to the following:

1. existing disparities and underrepresentation of Black learners and workers across the U.S. technology industry;
2. factors impacting technology career pathway exposure and exploration;
3. trends across education, training, job seeking, recruitment and attrition for Black learners and workers;
4. initiatives working to dismantle systemic barriers within the technology learning and workforce ecosystem, and;
5. next steps for continuing on the path toward better understanding on how to increase equitable opportunities for the inclusion and retention of Black learners and workers across the U.S. technology industry.

Noteworthy conclusions resulting from this work represent three strategic areas of action that can be taken by various technology industry contributors based on the following key findings:

Action 1: Build awareness of the underrepresentation of Black learners and workers, and bring attention to disparities they largely face, within the technology learning and workforce ecosystem

Key Findings:

- Systemic and opportunity barriers (e.g., limited access to broadband, digital skills development, professional social networks, equitable and culturally responsive education and training experiences; exclusionary and discriminatory funding, hiring, and performance evaluation practices; biased treatment within the workplace, etc.) impacting recruitment, entry, retention, and advancement within the technology learning and workforce ecosystem are particularly persistent and compounding for intersecting identities of Black learners and workers.
- Under-recruitment and underrepresentation of Black learners and workers
    1. limits the diversity of voice and perspective that can prove beneficial to internal and external progress and talent development within the technology industry;
    2. leads to the underuse of valuable talent, and;
    3. risks the development of technology based on dominant cultural perspectives, resulting in deepening biases and the perpetuation of systemic and opportunity barriers.
- Advocating for data transparency (e.g., releasing employee diversity data) and accountability measures across every level of the technology learning and workforce ecosystem is essential to building awareness and understanding of these barriers, as well as what strategic actions may need to take place to more equitably support Black learners and workers.
- Building awareness and attention to the aforementioned factors can help educational institutions, training providers, employers, policymakers, and other technology industry contributors better understand how to work toward dismantling these barriers and to progress on the path forward to increase diversity, equity, and inclusion in technology.

Action 2: Advocate for and invest in organizations, policies, and partnerships that improve the accessibility of technology industry education, training, and career entry opportunities to propel Black learners and workers of all education levels into technology career pathways.

Key Findings:

- **Organizations:** Individuals involved in technology exposure and exploration programs, services, and resources are more likely to pursue and/or enroll in educational and training opportunities related to technology careers.
- **Policies:** Companies must recognize additional pathways (e.g., non-four-year degree training programs, community colleges, military service, skills bootcamps, partial degree completion, learning on the job, etc.) that develop the technology skills and competencies necessary for workers to thrive within the technology field.
- **Policies:** By removing degree requirements and centering skills-based hiring processes, employers gain access to a wider and more diverse talent pool, and Black job seekers simultaneously gain increased access to opportunities to enter and traverse the technology field.
- **Partnerships:** Employers working alongside various postsecondary educational institutions, workforce development programs, and community based organizations can more effectively combine and utilize resources, networks, and funding to provide internships, apprenticeship programs, resume and interview workshops, wraparound support, and coursework that align learners' educational experiences to employer needs.

Action 3: Continuously prioritize, utilize, and analyze retention strategies to increase equitable support, sustain, and advance Black learners and workers of all education levels within the technology learning and workforce ecosystem.

Key Findings:

- Consider external factors that impact learners' and workers' overall wellbeing and provide personalized career support (e.g., career navigation assistance, workplace mentors, wraparound services and other resources) to decrease attrition rates.
- Create safe spaces and funding for initiatives such as affinity groups, through which individuals can connect on the basis of common interests, experiences, and/or identities to mitigate marginalization and feelings of isolation that Black learners and workers may experience in the technology industry.
- Foster learners' and workers' sense of belonging and inclusion, as well as provide opportunities for professional development (e.g., upskilling and reskilling current employees), networking, and collective voice within the technology learning and workforce ecosystem.
- Build cultural responsiveness of technology industry education and workforce leaders (e.g., unconscious bias training, respecting and valuing credentials of varying educational and training pathways throughout recruitment, retention, and advancement efforts) to develop, support, and sustain welcoming organizational culture.

These three strategic areas of action and key findings inform our future research that will focus on centering the Black worker and learner experience to increase awareness, understanding, and support of Black learners and workers in the technology industry. Through interviews, focus groups, and inclusive design sessions with Black workers, learners, and leaders within the technology industry, we aim to uncover individual and collective challenges, supports, and opportunities for success related to technology exposure and exploration, postsecondary education and training, job seeking, career entry, and advancement. Based on findings and recommendations generated from our future work, technology industry contributors including employers, education, and training programs may develop a better understanding of how to provide more robust programs, supports, and services to Black learners and workers seeking to enter and/or advance in the technology sector.

Introduction: Understanding Existing Disparities and Acknowledging Underrepresentation Across the Technology Learning and Workforce Ecosystem

The technology field has seen tremendous growth over the past decades, highlighted by the emergence and expansion of diverse subfields (e.g., artificial intelligence, cybersecurity, and non-programming technology careers within user experience (UX) design, product management, and scrum management), occupied by millions of skilled workers. While diversity within the technology industry has been critical for the development of strong and creative technology solutions within these fields, the recruitment and retention of diverse tech talent in today's society has been a challenge worldwide, especially for Black learners and workers. For instance, currently out of the 5.3 million tech occupation jobs that are within the U.S., Black Americans comprise only 8%, despite the historical and often unrecognized technological contributions that Black learners and workers have contributed to the U.S. for centuries (see **Figure 1**).

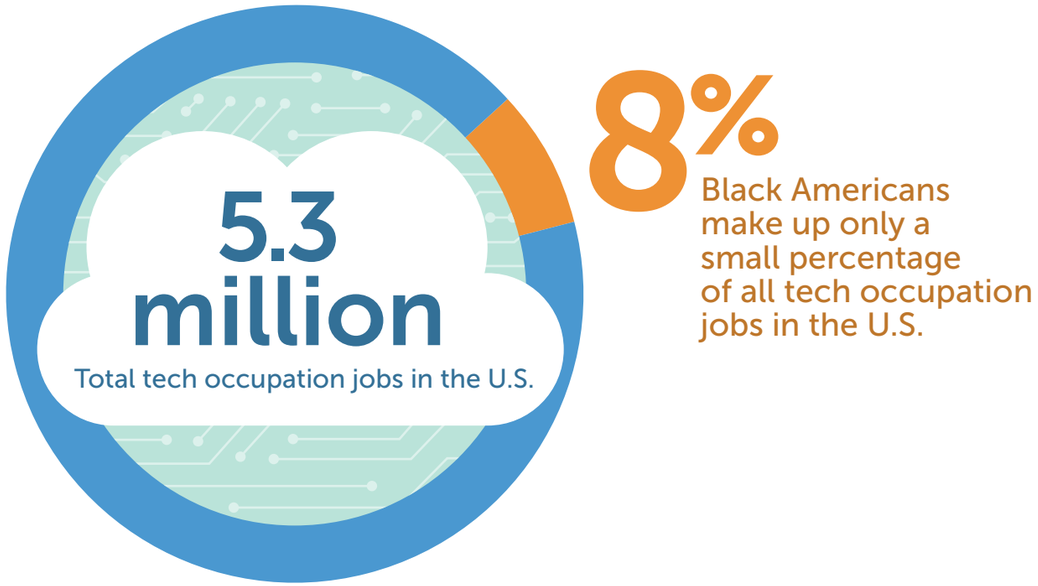


Figure 1

Historical Perspectives of the Black Experience in the U.S. Technology Industry

1500s

African Explorations of the Americas

Contributions in Science, Technology, Engineering, and Mathematics (STEM) in the U.S. have **deep historical and cultural roots that trace back to** African explorers who ventured to the Americas and **influenced technologies** such as those involved with oceanic navigation.

Drawing of Estevanico by Sam Patrick, circa 1969, OpenUCLA Collections

1619–1865

U.S. Slavery

New York Public Library digital collections

The transference of African STEM knowledge endured from generation to generation as Africans were continuously abducted, transported, and enslaved on a large scale via the transatlantic slave trade as European nations sought to colonize the Americas. For instance, historians have found slave houses built using African building technology, excavated clay pipes revealing West African pottery techniques, boat construction and rice-growing technique influences from West Indiana Blacks.

1876–1900

American Industrial Revolution

New York Public Library digital collections

Black contributions to STEM increased upon the end of the Civil War and as the American Industrial Revolution took place. Black workers and entrepreneurs made numerous innovations and patents that facilitated economic growth and technological advancement including railway safety devices, crop rotation systems, sewer drainage efficiency, and carbon filaments used in light bulbs.

1877–1964

Jim Crow Era

Tullio Saba from flickr.com

Even during the Jim Crow era, where **Black Americans continuously faced race-based educational, professional, and financial barriers and threats** resulting from discriminatory policies and disenfranchisement practices, Black influences on technology innovation in the U.S. persisted **and continue to have an impact on society today.**

1960s

Civil Rights Movement

NASA

Various **advocacy groups and initiatives** (e.g., Minority Engineering Program, Minority Access to Research Careers, and Affirmative Action) functioned to **boost the representation of Black learners and workers within STEM fields**, which significantly raised Black persistence in STEM programs, careers, and innovation by the 1990s.

1970s–1980s

Technology Education & Career Pathways

NASA Langley Research Center

The technology industry in the D.C. area, in partnership with the federal government, worked to create and maintain a technology career pipeline **(e.g., partnerships between K-12 schools, HBCUs, workforce training and technology companies)** within a geographic area heavily populated with Black individuals. As a result of these partnership efforts, Black workers today hold approximately 17.3% of computing jobs in Washington D.C.

1990s

Underrepresentation in Technology

Wallpaper by bigdawg from Wallpapers.com

The political climate within Silicon Valley (home to many tech giants) was largely anti-government and anti-affirmative action, which **limited opportunities for historically and systematically excluded populations, including Black workers and learners, from entering and advancing within the technology industry.** Today, Black workers hold only 2.7% of computing jobs in Silicon Valley.

2014–Today

The Path Forward to Increase Diversity, Equity, & Inclusion

Many technology companies kept workforce diversity data confidential, making it difficult to determine current representation. A shift occurred in 2014 when Google published its racial and gender demographics. This act led to several other prominent technology companies **releasing the demographics of their organizations.** Since then, there has been an **increase in investments for diversity initiatives and recruitment efforts** across the technology industry.

Despite this history illustrated in **Figure 1**, barriers to opportunity for Black learners and workers to enter and advance within the technology learning and workforce ecosystem still exist. Implications of several key events, including the persistence of zoning laws, explicit discriminatory institutional practices, and the non-renewing of affirmative action, has led to the continuation of racial segregation and the disenfranchisement of the Black population across the educational, social, and economic ecosystems. Under-recruitment and underrepresentation of diverse employees leads to the underuse of valuable talent and risks the development of technology based on dominant cultural perspectives, resulting in deepening biases and the perpetuation of systemic barriers. To best understand how to work toward dismantling these barriers and to progress on the path forward to increase diversity, equity, and inclusion in tech, we first closely examine the various systemic and economic inequities that exist across each layer of the technology learning and workforce ecosystem (see **Table 1**).

Table 1: Common Systemic and Economic Barriers Black Learners & Workers may Face within the Technology Learning & Workforce Ecosystem

Educational & Training Opportunities	• Limited and inequitable digital access (including owning a computer, having adequate and affordable broadband access, and digital literacy skills development and support opportunities) • Inequitable access and exposure to quality, well-funded, and culturally responsive technology curriculum and advanced preparatory experiences during K-12 schooling (especially for individuals identifying as Black females) • Lack of coordinated partnerships between the technology industry, K-12 schools, higher education and workforce systems, and local and state policymakers • Lack of accessible and affordable technology education and training designed for adults (which decreases exposure to and opportunities within technology fields) • Limited resume and interview skills development opportunities
Social Capital Access	• Limited access to professional social networks, mentorship, and diverse role models that can provide career guidance, support, and advice pertaining to recruitment, advancement, and retention within the technology industry • Stereotype threats, feelings of exclusion, and/or limited exposure to Black tech professionals that they can identify with, which can hinder entering and persisting within STEM learning environments and the technology industry as a whole
Financial Capital Access And Economic Mobility	• Exclusionary venture capital funding practices (e.g., From an analysis of 10,000 tech entrepreneurs and 135 venture capital firms, only 1% of tech projects receiving venture funding were Black individuals.) • The U.S. Racial wealth gap[1] that contributes to learning and workforce opportunity gaps and income inequalities that Black learners and workers often experience
Career Entry Opportunities	• Gatekeeper bias along with discriminatory hiring practices (e.g., employer overdependence on four-year degrees rather than inclusive consideration and skills-based hiring of diverse talent from alternative education and credentialing pathways; hiring bias against Black-sounding names; recruiters selectively recruiting talent from elite networks and institutions that have historically and systematically excluded minoritized populations) • Inequitable access to location-specific technology jobs
Career Advancement Opportunities	• Discriminatory career advancement practices (e.g., Black workers disproportionately receive less compensation and opportunities to occupy high wage technology positions than counterparts of other races with the same levels of education.) • Employers implementing biased performance evaluations and decision making regarding pay
Career Retention Supports	• Lack of diverse management and/or managers that remain resistant to Diversity, Equity, Inclusion, and Belonging (DEIB) efforts • Unfair/biased treatment within the workplace including harassment, bullying, and having to prove their competence more than others (which disproportionately impacts individuals identifying as Black women) • Under-supported Employee Resource Groups (ERGs) • An increased perception that minimizing heritage and identity is necessary to 'fit in' the workplace

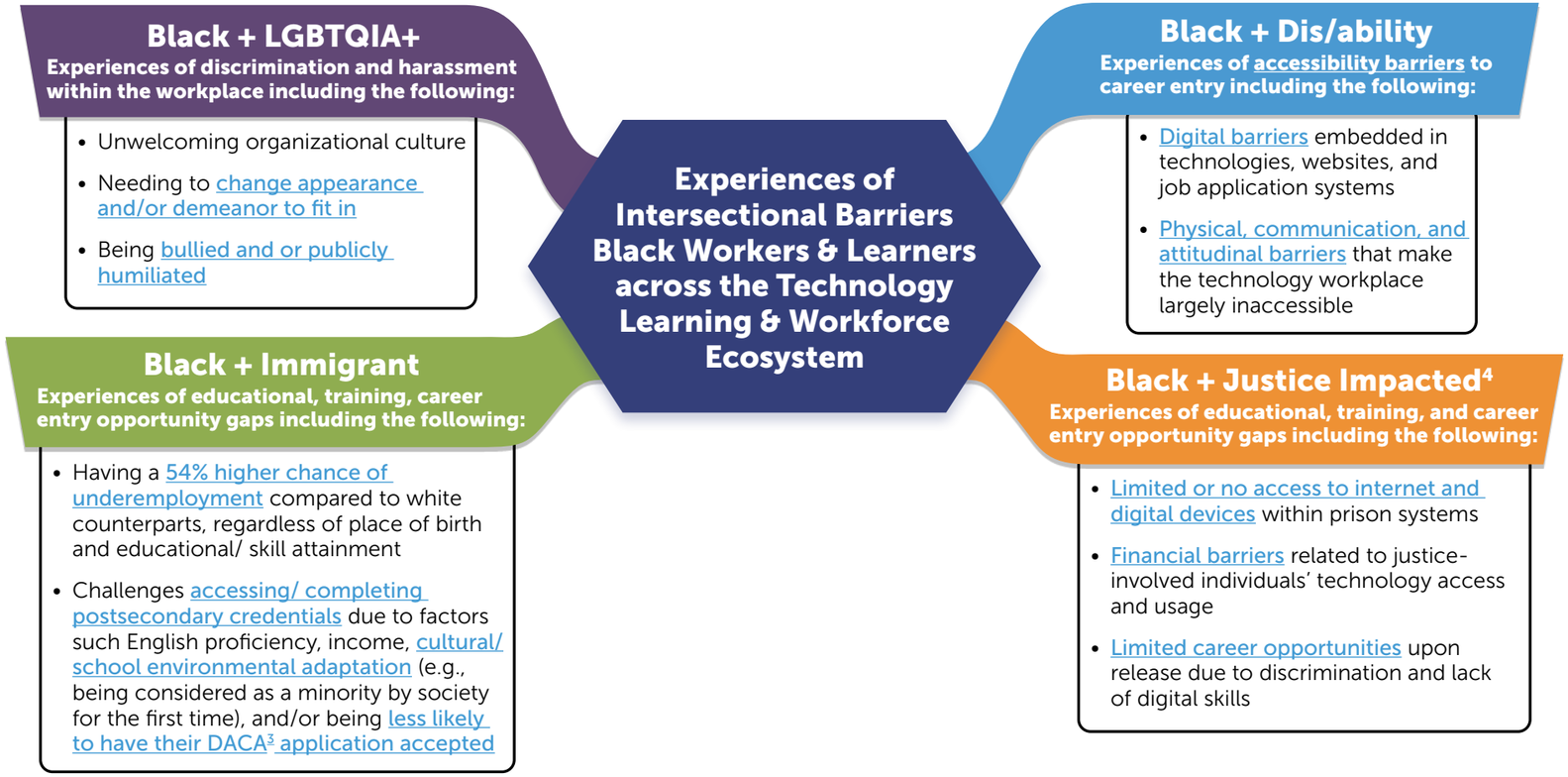
1 Racial wealth gap: The disparity in household assets across race and ethnicity as a result of decades of racial inequalities causing inequities across income, housing policies, and educational opportunities

As shown in **Table 1**, Black learners and workers continue to be underrepresented in the tech field due to the compounding effects of barriers impacting educational and training opportunities, social and financial capital access and mobility, and opportunities related to career entry, advancement, and retention. For instance, the degree to which information and resources related to the technology industry can be accessed through K-12 and postsecondary **educational and training opportunities** critically impacts levels of awareness, exposure, interest, exploration, and engagement within technology career pathways. Further, inequitable social and/or financial capital can contribute to decreased access and ability to persist in educational, training, career entry, and advancement opportunities within technology career pathways. Barriers related to technology **career entry and advancement** contribute to labor market and workforce disparities (including limited opportunities for job mobility, career growth, and high-wage occupations), despite the level of credentials and/or skills that they may possess. Black learners and workers that do manage to enter the technology workforce may have limited culturally responsive **career retention supports** (regardless of company reported diversity commitments) which leads to higher attrition rates of Black tech employees.

Intersectionality[2] in the Technology Industry

It is equally important to highlight the disparities that exist and are compounded for intersecting identities (e.g., race and gender, sexual orientation, dis/ability, immigration status, socio-economic status, etc.) within the Black population. In doing so, employers, educators, and policymakers can better understand and work to dismantle different forms of systemic oppression across the learning and workforce ecosystem that can have varying effects on the lived experiences of individuals based on how they identify and/or are profiled. The following **Table 2** represents examples of compounding barriers Black learners and workers may face (in addition to the barriers listed in **Table 1**) as a result of their intersecting identities:

Table 2: Experiences of Intersection Barriers Faced by Black Workers & Learners



2 Intersectionality: the ways in which different forms of oppression based on race, gender, sexual orientation, dis/ability, class, and other identities intersect resulting in compounding effects of discrimination and marginalization.

3 DACA: An acronym that stands for Deferred Action for Childhood Arrivals and refers to a policy that protects undocumented immigrants who came to America as children (also known as DREAMers) from deportation and allows them to apply for a driver's license, social security number, and work permit.

4 Justice-Impacted: individuals who have been incarcerated, arrested, convicted, and or detained within a jail, prison, juvenile or immigration detention center.

What Have We Learned?

KEY IDEAS: Overall, these systemic and economic barriers that Black learners and workers often face place limits on the diversity of voice and perspective that can prove beneficial to internal and external progress and talent development within the technology industry. Disparities, intersectional oppression, historic patterns of occupational segregation, and high attrition rates within the technology learning and workforce ecosystem will continue to increase if no actionable steps are taken by educational institutions, training providers, employers, policymakers, and other technology industry contributors.

To promote the dismantling of these barriers, in the following sections, we describe promising pathways and initiatives that are actively working toward understanding, developing, and providing educational and career training supports, career services, and policies that are most likely to sustain and/or increase the motivation, persistence, and representation of Black learners and workers pursuing technology careers.

Initiatives Working to Dismantle Systemic Barriers within the Technology Learning and Workforce Ecosystem

Technology Exposure & Exploration

As individuals gain awareness of the possibilities of technology through exposure to and exploration of various aspects of the technology industry, learners may be inspired to pursue pathways to technology careers. Learners have been found to eliminate career options as early as elementary school, so it is essential to advocate for and invest in innovations that improve the accessibility of technology industry opportunities, which can in turn help to propel Black learners and workers of all education levels and ages into technology pathways. To accomplish this aim, various reports have identified recommendations that policymakers, educators, technology industry leaders, and community members can follow. To the right is a synthesis of these recommendations along with references to the corresponding reports:

- Increase Equity in K-12 Education **(including providing funding for** wraparound services**,** access to laptops and internet to decrease the digital divide**, etc.) that address challenges that may exist outside of school but affect students' academic success.**
- Address technology career stigma early **and** increase the prevalence of diverse technology role models **to increase Black learners' self-efficacy in technology career pathways.**
- Expand computer science education and other technology-related courses**.**
- Increase inclusive partnerships between K-12 and industry **(e.g., the** P-TECH Model**) as well as** with universities **to allow students to access more work-based learning experiences such as internships and apprenticeship programs, as well as to provide students with transferable technology skills and stackable, industry recognized** credentials**.**
- **Provide K-12 teachers professional development and access to labor market information (e.g., skills and competencies needed in an industry) and externships that can be incorporated into their career curricula.**
- **K-12 schools and districts** engage and communicate with families **to strengthen relationships and improve student knowledge and preparation of career pathways and opportunities.**

The Code.org Advocacy Coalition has advocated for recommended policies within all 50 states to require and allocate funding for computer science to be incorporated as a foundational course within the K-12 education system. The Coalition provides information such as this:

- *state summaries that highlight data regarding each state's status on the adoption of computer science policies*
- *school participation data*

Additional political action and programming, such as the **Digital Equity Act***, aim to provide funding and targeted resources across states to:*

- *improve digital equity and*
- *contribute toward digital skill building among populations most affected by the digital divide*

JFFLabs, Melanin.Tech, and others have curated lists of programs, organizations, and innovative initiatives that promote Black learners' and workers' early technology career awareness, exploration, and identity development through academies, summer camps, afterschool programs and internships. **Table 3** includes a compilation of these resources, which also provide technical training to support Black learners and workers to build their skills and knowledge of tech.

Table 3: Technology Career Exposure & Exploration Resources

• All Stars Code • America on Tech • Black Data Processing Associates • Black Boys Code • Black ComputeHER • Blacks in Technology • Black Family Network • Black Girls Code • Black Tech Nation • Black Tech Pipeline • Brown Girl Tech World • Code Crew • Code Day • Coded by Kids	• Code Nation • Code Now • Color <Coded> • Dream Corps Tech • Ed Farm • Gameheads • Girls Who Code • Google Code Next • Hack the Hood • INTech Foundation • Mission Bit • Mission Fulfilled 2030 • Mobilizing for Racial Justice	• Rensselaer Pipeline and Partnerships • Smash • Sports Analytics Club Program • STEM City USA • STEAM Role • Technologists of Color • Teens Exploring Technology • The Hidden Genius Project • We Build Black • Wonder Women Tech • Year Up • Zyrobitics

KEY IDEA: Individuals involved in technology exposure and exploration programs, services, and resources such as these are more likely to pursue and/or enroll in educational and training opportunities related to technology careers, such as those described in the following sections.

Postsecondary Education & Training

Introduction

While four-year college degrees are widely promoted views of educational pathways that can lead to learners obtaining increased job and economic mobility opportunities, to many individuals, including Black learners and workers, this form of education can be inaccessible and/or inequitable. Further, the attainment of such degrees does not preclude individuals from experiencing labor market and workforce disparities. Acknowledging these disparities, postsecondary institutions and programs have created partnerships and viable pathways to mitigate inequities that persist. Through these partnerships, educational and training pathways, such as career and technical education (CTE) programs, community colleges, and apprenticeships, are increasing educational accessibility and affordability (e.g., incorporating wraparound services for support) and can equally provide skills-based training and credentials that can lead to high paying jobs and successful career mobility. Below we highlight a synthesis of alternative educational and training pathway resources and recommendations that can be utilized by employers, educational institutions, policymakers, and other advocates to support Black learners and workers seeking technology career entry and/or advancement.

Community Colleges

Credentials obtained at community colleges are more cost-effective, require less time than completion of a full baccalaureate curriculum, and are more accessible given proximity to the homes of learners. Tech giants such as Apple, Google, Microsoft, IBM, and Intel have taken initiatives such as those highlighted in The Workforce Playbook by expanding workforce development relationships through community colleges. Through workforce partnerships, companies collaborate with various community colleges on curriculum design, certification, and credential programs and offer internships and apprenticeships.

RESOURCE: Brookings' **Toolkit for Building Successful Community College-Employer Relationships** *provides practical and actionable steps for community college leaders to create productive partnerships between colleges, industries, and local businesses.*

Policy Opportunity

Invest in HBCUs

Historically Black Colleges and Universities (HBCUs) have received wide recognition for their role in producing a disproportionate high percentage of graduates with bachelor's degrees entering into computer science related fields through targeted culturally responsive supports. Yet, many HBCUs are significantly underfunded and face shortages of critical student resources when compared to Predominantly White Institutions (PWIs). Financially investing into HBCUS can create equitable educational and training opportunities for Black learners and workers seeking more accessible credentials pathways into their desired technical career.

RESOURCE: A **national network of 22 HBCCs (Historically Black Community Colleges) and PBCCs (Predominantly Black Community Colleges)** *shares research and practices to strengthen the career and economic outcomes of Black community college students via the alignment of programming and support services with current workforce needs (e.g., technology focused careers).*

Career & Technical Education (CTE) Programs

CTE programs utilize real-world contexts to blend academic and technical skills along with workplace competencies and training so that learners can gain tools to successfully navigate the current labor market. Additionally, CTE programs are aligned to industry-validated standards and are designed for learners of all backgrounds, education levels, and career pathways. For instance, in the state of Washington, learners and workers have the opportunity to take CTE courses such as Sustainable Design & Technology and Electronics, Engineering & Design. The courses are aligned with STEM careers in civil, aeronautical, robotics, and mechanical engineering.

Resources such as the following have been developed to support individuals in finding interest-aligned CTE programs and contributors creating equitable CTE opportunities:

- Advance CTE provides an interactive tool **that allows learners and workers to identify and compare CTE opportunities, CTE plans of study aligned to specific career pathways, enrollment demographics, and CTE completion reports within every state of the U.S.**
- CTE Without Limits **outlines equity centered principles for designing a CTE ecosystem that coordinates federal, state, and local systems, structures, policies, and practices so that each learner can have access to and career success from high quality CTE programs.**
- **Jobs for the Future** "End Occupational Segregation, A Purpose-Built Call to Action" **report outlines several actions and policies that when implemented effectively can help various contributors reimagine and transform education and training systems to promote Black learners' attainment of high-quality, affordable, and stackable career credentials with labor market value.**

Policy Opportunity

Funding & Aligning CTE Programs

With the passage of the Strengthening Career and Technical Education for the 21st Century Act in 2018, states are required to create program performance objectives and local needs assessments when applying for CTE funding, encouraging better alignment between local employment needs and CTE programming.

- The Center for American Progress advocates for the distribution of CTE funding to both K-8 preparation and high school for the purpose of increasing/enhancing CTE programs and recruiting/retaining high-quality CTE instructors.
- The Association for Career & Technical Education (ACTE) calls for various contributors to strengthen CTE's role in postsecondary education and increase access to apprenticeship programs to better support students' attainment of industry-recognized credentials and have stronger connections between education and workforce development systems.

Upskilling/Reskilling Opportunities

Technology bootcamps offer learners opportunities to develop skills and tangible products in areas such as data science, UX/UI software, cybersecurity, and coding. These bootcamps are generally short in length, accessible to varying levels of experience, and can be used as a way to up-skill and/or re-skill individuals seeking to enter, advance, or transition across technology careers.

Internships within the technology industry are opportunities for learners to apply practical technology knowledge and skills toward real-world situations; network within companies to obtain future career opportunities; and gain possible compensation, higher earning potential, and/or job offers after internship completion.

Apprenticeships are work-based learning experiences that enable learners to earn a living while obtaining real-world work experiences through training and education. Within tech, apprenticeship programs are an effective way to address IT skills gaps, connect companies with qualified technology workers, upskill and reskill employees, and diversify the IT talent pipeline by providing historically and systematically excluded learners alternative pathways to enter into the industry through skills-based hiring. Year Up and Accenture's National Apprenticeship Program are examples of apprenticeship organizations and initiatives that provide targeted skills training support and mentorship for underrepresented workers and learners in the IT industry.

KEY IDEA: According to the Kapor Center, many companies contribute to technology industry disparities by setting up apprenticeship programs within career pathways that are highly at risk for displacement caused by automation. Consequently, it is essential that contributors—seeking to diversify the technology talent pipeline through the creation and implementation of apprenticeships—provide sustainable and equitable opportunities for learners upon completion of the programs.

Table 4 highlights examples of the following:

1. **technology bootcamps**, along with information regarding topics and **skills** covered, cost, locations, and **potential career pathways** associated with each;
2. **organizations that provide supports, including resources and partnerships** with technology bootcamps, that are specifically targeted toward underrepresented groups seeking to enter the technology field, and;
3. **internships** that have been designed to support underrepresented racial and ethnic groups to help decrease inequities within STEM and increase the successes of BIPOC learners and workers.

Table 4: Upskilling & Reskilling Opportunities Resources

Technology Bootcamp Resources & Partnerships

- Coding bootcamps
- Cybersecurity bootcamps
- Data Analytics bootcamps
- Data Science bootcamps
- Digital Marketing bootcamps
- Fintech bootcamps
- User experience (UX) / User interface (UI) design bootcamps
- Ada Developers Academy
- Code2040
- General Assembly
- Girl Develop It
- Hackbright Academy
- Lesbians Who Tech
- The Grace Hopper Program at Fullstack Academy

Internships

- APS/ IBM Research Internships for Underrepresented Minority Students
- Capital One Technology Internship Program
- Explore Microsoft Internship Program
- Google BOLD Internship Program
- Infosys InStep Internship Program
- Massachusetts Clean Energy Internship diversity pilot program
- Meta University
- Minority Educational Institution Student Partnership Program (MEISPP)
- Minority Serving Institutions (MSI) Intern Program
- Oracle Scholars Program
- Talent Development and Innovation in Sciences Summer Internship

Micro-credentials

are digital certifications that verify an individual's skill competence developed across their education and work experiences.

Micro-credentials can be "stacked" together to provide certifications or endorsements that signal workforce readiness for in-demand job pathways.

Through a four-year U.S. Department of Labor Strengthening Community College grant of $4.85 million, Savannah Technical College, in collaboration with workforce development and employment partners, are supporting adult learners in gaining micro-credentials to showcase their skills. After a successful pilot with a manufacturing program, they are developing an IT track.

High School Equivalency Programs

can help individuals obtain a GED so that they can gain better employment or begin postsecondary education or vocational training.

Example supports that high school equivalency programs can provide include free textbooks and materials, free GED testing, career readiness workshops, and financial assistance based on need. Flexible class schedules such as evening or weekend classes are also offered, which can help individuals who are working, caregiving, having limitations with transportation, or other needs.

Workforce Development Agencies & Job Centers

offer training, continuing education programs, and additional free career support. There are nearly 2,400 American Job Centers, which offer resource finder tools to help workers and learners locate services such as apprenticeships, re-entry programs, refugee assistance, community colleges, unemployment benefits, and more.

Wraparound Supports

Wraparound supports play an important role in both non-degree and postsecondary persistence and retention rates in technology pathways, particularly for learners who have been historically and systematically excluded. Wraparound services center practices and support on the learner using a holistic approach. The dimensions of support include financial aid and safety nets, housing, physical and mental health, food, childcare, transportation, and actions to foster a sense of belonging and counseling. In 2022, the Hunt Institute highlighted equity-focused wraparound services and shared examples of institutional and state policies supporting learners and workers across each of these dimensions. Further, research conducted by MDRC and published in 2020 found that comprehensive programs offering wraparound support increase college completion rates when replicated in other contexts, as well.

One model that has been successfully scaled across contexts is The City University of New York (CUNY) Accelerated Study in Associate Programs (ASAP) which provides tuition waivers for students receiving financial aid who have a gap, textbook assistance, and MetroCards; flexible enrollment pathways that allow learners to move at a pace that works for them; and direct support like personalized advising, tutoring, and career development.

Education Commission of the States *featured Ventura College's basic needs office as one that offers comprehensive wraparound support, including help applying for CalFresh, the state's food assistance program. The office also helps students access resources to meet their housing, health, and transportation needs.*

For learners and workers developing skills outside a formal institution, accessing support can be even more difficult. In cases where physically attending classes is a barrier, Dallas Community College District and Houston County Community College System developed a virtual platform to find degree and non-degree training options, as well as learner support. The platform brings together both Career and Technical Education programs as well as industry-recognized non-credit certifications in one place for learners to access. Other resources include organizations like Path Forward, which helps individuals restart their career after caregiving.

Funding Education, Training, and Wraparound Services

Applying for student loans to support postsecondary learning journeys can be overwhelming for many learners. College Advising Corps is a nonprofit that pairs peer-advisors with students to navigate the FAFSA student loan application process. In many states, qualifying for federal student aid is the first step toward accessing many other wraparound support and services, so completing that application is essential.

In some regions, public partnerships, like those in San Mateo County, CA, have reduced barriers to community college enrollment by removing fees. Effective January 2, 2023, the San Mateo Community College system is free to learners after Governor Gavin Newsom signed SB 893. The college trustees and county supervisors agreed to allocate funds to support the program. Learners who qualify for federal funds can have activity and administrative fees waived as well.

Comprehensive programs like The City University of New York's (CUNY) Accelerated Study in Associate Programs (ASAP) provides financial assistance and structured pathways to support full-time enrollment and academic progress, personalized advising, career development services, and community engagement opportunities. Joint funding through the Mayor's Office of Economic Opportunity, the State of New York, and philanthropic donations make this program possible.

Policy Opportunity

Establish Joint Funding

The importance of joint funding efforts that ensure stability and continuity for learners and reduce the burden on a single funding source are highlighted through additional initiatives such as Code Louisville. Code Louisville, initially a federally funded 12-week training course in full stack web development at the Louisville Free Public Library, saw enrollment numbers plunge after their program required a fee due to the loss of funding. However, after KentuckianaWorks, the region's workforce agency, received a total of $400,000 from the Kentucky Workforce Development Cabinet and Metro Louisville, the program has no cost, and subsequently, enrollment numbers have skyrocketed.

What Have We Learned?

Key Recommendations for Postsecondary Education & Training

Rather than solely focusing on job seekers with four-year college degrees, research shows that to be truly successful, companies must also recognize additional paths (e.g., training programs, community colleges, military service, skills bootcamps, partial degree completion, learning on the job, etc.) that develop the technology skills necessary for workers to thrive within the technology field.

Across technology firms, companies such as IBM and Accenture have the lowest prevalence of degree requirements for IT occupations and have placed a greater emphasis on skills within the hiring process. Some companies have not only begun to reduce requirements but also focus on building relationships and partnering with various training programs. JPMorgan Chase has developed an immersive internal training program in software engineering and a four-year apprenticeship program that allows students to earn a degree while working in the firm's technology units (McKinsey Global Institute, 2019).

By removing degree requirements and centering skills-based hiring processes, employers gain access to a wider and more diverse talent pool, and Black job seekers simultaneously gain increased access to opportunities to enter and traverse the technology field.

Further, community colleges in partnership with workforce development programs and local employers often provide internships, apprenticeship programs, resume and interview workshops, wraparound support, and coursework that align learners' educational experiences to employer needs.

To continue ensuring the success of Black learners and workers who aim to enter the technology industry, it is essential for community college contributors to follow the guidance provided by the aforementioned Workforce Playbook and Brookings' Toolkit. Further, ensuring wraparound support, outside of tuition waivers can enable students to persist in postsecondary education.

Policy Opportunity

Develop Partnerships

Public investments in postsecondary education and training are essential for developing high quality and low cost programs. The National Skills Coalition Closing the Digital Skill Divide report recommends that policymakers invest in partnerships between industry, training providers, and community colleges so that the development of Black talent is linked to industry-specific skill needs and jobs.

Partnerships between libraries and state, county, or local workforce development agencies to increase access to workforce development experts are crucial to support job seekers in navigating the local and the regional job market. This is due to the fact that libraries have long been an accessible hub for job seekers and learners, offering free Internet access and digital skills training.

RESOURCES

Higher Ed Dive *shares that guided pathways, tailoring instruction to workforce needs, using stronger and effective communication practices, and providing individualized support are necessary to retain Black learners and workers in non-four-year degree pathways.*

Ed Farm *addresses gaps in K-12 and adult computer science education with wraparound supports including participation stipends and device grants.*

Black Tech Pipeline *provides recruitment services, jobs, educational resources and programs, scholarship and funding opportunities, or events to connect existing or aspiring Black technologists to careers and companies with diverse, equitable, and inclusive work environments.*

JFFLabs and others have curated lists of learning and training programs, organizations, and workshops that can help to increase Black learners and workers attain credentials connected to opportunities for advancement within the technology industry. See **Table 5** for a synthesis and direct access of these resources.

Table 5: Postsecondary Education & Training Resources

• ADA Developers Academy • All Star Code • America on Tech • Apprenti • BITWISE Industries • Black Boys Code • Black Professionals in Tech Network • Braven • Breakline • Brown Girl Tech World • Byte Back	• Catalyte • Code2040 • Code Crew • Code Day • Code Nation • CodePath.org • <Coding Black Females/> • Color <Coded> • Color Stack • COOP Careers • Dream Corps Tech • Ed Farm	• Gameheads • General Assembly • Generation USA • Girls Who Code • HBCUvc • Landit • MLT • The Marcy Lab School • Mentor Spaces • Mission Bit • NACME: National Action Council for Minorities in Engineering	• Npower • Onramp • Opportunity Hub • Oracle Academy • Per Scholas • Pursuit • Resilient Coders • Sans Cyber Immersion Academy • SEO Career • Sirius XM + Pandora • Skillful	• Tech Impact • Tech Bridge • Technologists of Color • Techtonica • The Hidden Genius Project • Hatch • VSchool • Wall Breakers • Workday • Year Up • Year one • Yellow Brick

Entering & Transitioning Across Technology Career Pathways

While approximately 9,600 computer programing jobs are expected to open for each of the next 10 years, the Bureau of Labor Statistics (BLS) states that the employment of computer programmers is projected to decline by 10% from 2021 to 2031 due to increased automation. Specifically, technologies are being leveraged to automate repetitive tasks, such as code formatting, which will save companies time and money. Automation will allow computer programmers to focus on skills that can not be automated, such as strategic planning activities. So, although coding has long been a featured entry point into tech, it is important for Black learners and prospective workers to be informed and prepared for this shift.

EXAMPLE NON-CODING TECH CAREER PATHWAYS: In the following sections, we provide examples of non-coding pathways that are among some of the fastest growing subfields across the technology industry and have been found to be conducive for non-four-year degree job seekers. Within these examples, we highlight resources that can support Black learners and workers seeking to enter and transition across the technology field.

Cybersecurity

While some do, not all cybersecurity jobs require technical, coding, or programming skills. Cybersecurity specialists are crucial to securing and protecting information systems. Within this role, individuals work to mitigate security threats (e.g., hacking and viruses) through the monitoring, detection, and analysis of software, hardware, and networks. There has been an increase in initiatives to create and sustain structural supports geared toward increasing diversity efforts across the cybersecurity ecosystem. For instance, the Aspen Institute convened over 60 cybersecurity professionals who represented various affinity groups, cybersecurity firms, government agencies, nonprofits, multinational corporations, and startups to discuss DEI recommendations within the areas of education, recruitment and hiring, retention, mentorship, and shifting the narrative within the cybersecurity field.

Forbes provides examples of cybersecurity initiatives that have been geared toward specifically supporting minorities and Black learners and workers, such as 1) creating or expanding funding for cybersecurity scholarships (e.g., in 2023, Microsoft will award 50 collegiate scholarships to Black and African American students to encourage the pursuit of careers within technology) and 2) advocating for a diverse workforce (e.g., by 2025 Google has committed to reserve 30% of their leadership positions for minoritized populations). To effectively address the cybersecurity skills gap and increase diverse representation and talent within the field, it is imperative that cybersecurity leaders, employers, educators, and policymakers continuously work toward implementing the aforementioned actions.

User Experience (UX) Design

One of the rapidly growing fields of technology, user experience design is concerned with developing technology so that programs are more enjoyable for users and easier to use. UX designers often don't share work histories or educational backgrounds, and many UX designers may choose to learn on their own by earning credentials (e.g., UX design certifications) that build the necessary skills to obtain entry-level jobs in the field. The foundational elements of user experience design include empathizing with users, building wireframes, creating prototypes, and conducting research to test designs. UX designers are often tasked with anticipating user needs, turning complex problems into solutions, applying design thinking, and implementing new and established research methods.

Scrum Analyst/Scrum Master

One accessible pathway for non-degree holders is a less commonly referenced field known as *scrum*, a specific project management philosophy (with a core set of values or principles) that is used to facilitate a project. The scrum concept provides a framework that leverages teamwork and project management via an incremental process that remains adaptable (Pejcinovic, Bass, & Wong, 2018). This concept utilizes cyclical feedback processes that are relatively short and finite to assess project progress, which allows increment updates during project planning and completion of small deliverables. A scrum analyst (or "scrum master") functions as a project manager, focusing specifically on the process, ensuring that things remain organized, and that their team (specialists, developers, etc.) has everything that they need to complete their goals successfully. Scrum analysts/masters provide input on methods used to complete tasks by the team and other contributors. They may also provide input on the development of team outputs (e.g., products or services).

While some positions may request that job candidates hold a bachelor's degree in computer science, business administration, management information systems, etc., many of these positions do not require specific credentials if candidates have experience in relevant areas.

Product Managers (PM)

Product management incorporates design, business, and engineering in order to develop new concepts. This role allows individuals to be creative and utilize storytelling abilities in order to help produce products that consumers can readily and willingly adopt. The goal of product managers is often to generate products that can garner significant amounts of revenue by altering the current marker.

According to the Harvard Business Review, successful PMs have several core competencies (conducting customer interviews, user testing, running design sprints, prioritization, map planning, resource allocation, performing market assessments, translating between business and technical requirements, revenue modeling, and tracking success metrics). While some of these can be acquired in a classroom, most are thought to be developed with experience and mentorship. In addition, emotional intelligence, relationship management, self-awareness, and self-management are beneficial characteristics for this role.

In order to establish substantive support in this space, developing a significant network and social capital are important. Experienced Product Managers also recommend leveraging networks to develop contacts that can provide referrals when applying for jobs. Seeking out mentorship in this space may also yield contacts that can provide support in this way.

Job Seeking & Recruitment Resources

Job seekers can utilize resources, such as those found through AnalytixLabs and Career Karma that provide support for AI skills development and strategies for AI career pathway navigation. Digital platforms such as Indeed, LinkedIn, and Zippia, used to apply to technology jobs by a range of qualified applicants, may benefit Black learners and workers when introduced to at earlier stages of career exploration. These three platforms include search feature options that allow job seekers to select education levels. The ability to filter options in this way may allow for increased agency as well as decreased time and frustration when searching for viable positions. Zippia also generates career maps that demonstrate potential career paths for workers. For prospective workers that have yet to enter the field and those who may have limited experiences, this feature may serve to increase awareness of career options and provide clear pathways for success.

Conferences can serve as another beneficial means to increase professional networks in the technology industry by providing opportunities for job seekers to meet face to face with representatives of various organizations. Networking with others provides job seekers opportunities to learn and build skills as well as gain valuable insights into potential employers that can be beneficial to job application processes and technology career outlooks overall. Technology career webinars are also an additional resource for job seekers to learn industry-related concepts from technology employers and engage with others in an accessible, interactive online platform.

Conferences specifically for Black employees can help mitigate feelings of isolation and promote leadership development and training that relate to professional experiences.

The following list highlights example ongoing conferences that are designed to support Black learners and workers in the technology industry.

- AFROTECH Conference
- AfroTech World
- Black Is Tech
- Black Tech Fest
- Black Tech Week
- Mavens I/O: Black Women in Tech Conference
- Unicorn Ambition Conference

Policy Opportunity

Fund Retention Efforts

Companies such as IBM, Meta, and Microsoft have created initiatives to increase the education and recruitment of diverse individuals to technology fields. While efforts such as these are becoming more commonplace, it is equally as important to focus on policies that improve the retention of Black learners and workers in technology to combat increasing attrition rates (e.g., publishing compensation levels, harassment and discrimination transparency reports, and improving hiring/retention of diverse voices at all organizational levels).

Personalized career support in the form of career placement assistance has also shown to be especially beneficial for job seekers without four-year degrees. Employment centers, or job centers, have been found to reduce local unemployment, particularly in areas with fewer resources and limited opportunities. These centers staff experts who can support Black learners and workers in navigating marginalization and job placement. Prior research has also shown that Black learners and workers benefit from these (One-Stop) employment centers more than other racial and ethnic groups. Other career support resources include organizations such as Upwardly Global, which supports immigrants and refugees with international credentials through the process of restarting their careers within the U.S.

Community Based Organizations, such as multi-service centers, may provide a range of services to help adult learners who may be transitioning between locations and/or employment. These services can range from SNAP assistance forms to providing emergency funding and shelter referrals, counseling services, free Adult Basic Education (including math, reading, and writing), and English as a Second Language classes. Other types of nonprofit organizations, such as libraries, can provide resources such as digital skills training support, access to computers and online resources, resume writing help, and assistance with job applications.

Networking & Building Social Capital

While networking and social capital is difficult to measure, efforts by Jobs for the Future to curate existing knowledge has demonstrated that increasing social capital can increase diversity within the workforce. According to Brookings (2021) Black men tend to maintain smaller professional networks compared to all other demographics within the workplace. These smaller networks reflect lower rates of employment (and higher rates of unemployment). Similarly, Black women are less likely to have mentors within the workplace. This can be attributed to feelings of isolation due to a lack of representation in the workplace or technology sector as a whole. These findings substantiate the importance of organizations for Black professionals in IT and Black Professionals in Tech Network that seek to connect and provide support and space for Black learners and workers in technology as they navigate the ever evolving professional landscape of the industry while acknowledging the nuanced experience of being a Black professional in the technology industry. In additional efforts to increase social capital among Black learners and workers, JFF has composed a framework of comprehensive postsecondary strategies in their recently released report, Building Professional Social Capital for Black Learners and Workers.

Policy Opportunity

Center Accessibility

With the rapid acceleration of technology, technology jobs are also evolving in parallel. However, this increasing pace increases the difficulty for training providers to modify their accommodations and teaching practices needed to support individuals with disabilities in developing key skills to enter and sustain careers in tech. Based on the identified challenges for individuals with disabilities, the Institute for Career Development and the New York Institute of Technology created a list of recommendations for employers, policymakers, training and service providers to improve access to opportunities for individuals with disabilities seeking jobs within the technology workforce.

Support Reentry Pathways

For individuals who are justice-impacted and returning from incarceration, reentering career pathways can be especially challenging to navigate. Aspen Digital, in collaboration with the Aspen Criminal Justice Reform Initiative and Slack, created the Rework Reentry Playbook to help tech companies understand the steps necessary to equitably hire and support individuals returning from incarceration.

Mentoring & Coaching

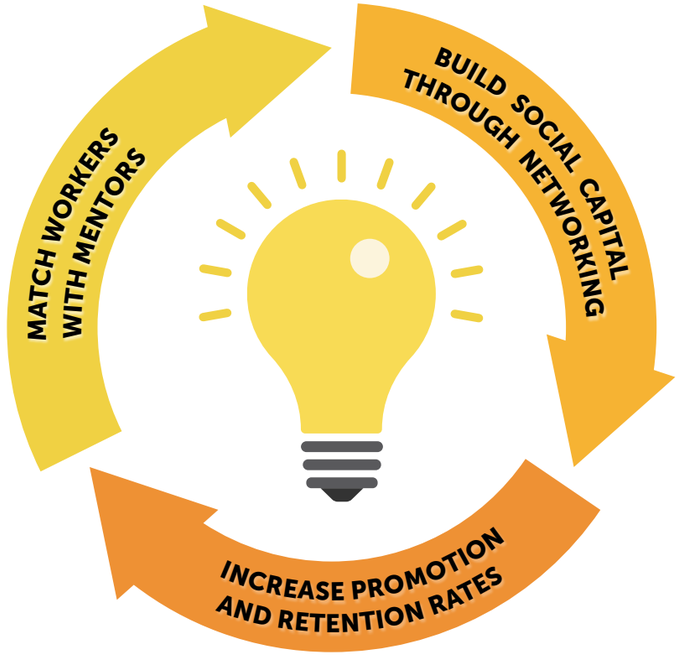
Though career and technology education (CTE) course offerings can be found on high school campuses throughout the country, a 2020 Hechinger Report highlights the lack of exposure for Black and Brown students to professional career paths in the technology sector that lead to higher paying roles and skill building experiences. A lack of knowledge regarding these roles and opportunities limit postsecondary pursuits of careers in technology based fields for Black students. To address this gap, organizations like Techbridge partner with HBCUs, community-based programs, nonprofit organizations, and industry professionals to inform and mentor Black learners and workers on opportunities and career paths in tech. This includes career coaching components that may significantly benefit Black learners and workers without four year degrees.

> ***Programs designed to match workers with mentors increase promotion and retention rates of historically underrepresented workers up to 38%.***

> ***Black managers are 65% more likely to progress if they are sponsored.***

Relationships such as these are vital to individual and industry growth. The knowledge and skills acquired through these efforts help to build capacity in the workforce while also providing a layer of support through mentorship to developing technology professionals. A recent study conducted by the Info-Tech Research Group highlights the benefits of mentorship and coaching, asserting that, "while mentorship and sponsorship opportunities are important for all employees, they are especially helpful in closing the job satisfaction gap for Black IT professionals" who noted feeling unsatisfied in work environments with limited opportunity for growth and advancement.

In addition, sponsorship or serving as an advocate for a junior worker and ensuring the availability of opportunity to continually gain skills, is also an important component to provide to those interested in pursuing positions or advancement. Evidence suggests that Black employees are less likely to quit a position when they are sponsored by another worker. These efforts toward support align with the importance of building social capital through networking.



Recommendations for Supports for Retention

Additional areas of opportunities to close the talent gap and increase the retention of Black learners and workers within technology careers include employers taking these steps: upskilling or reskilling current employees; identifying baseline skills that give workers the best chance of success for developing the needed skills; increasing stipends that cover employee education programs; providing employees a base level understanding of technology; recruiting diverse middle managers and senior leaders who can mentor or sponsor early technology career workers and learners; and collecting and being transparent with company diversity data to see if strategic action is needed to more equitably support various groups.

> *Approximately **one-third of U.S. workers lack foundational digital skills**, with workers of color representing a disproportionate fraction of this group.*

A **multilayered approach** to retaining and supporting Black learners and workers in technology is key in promoting and sustaining individual and organization success. To do this effectively, employers can begin by taking these steps:

Address the foundational skills of the tech workforce. All workers need the opportunity to develop broad-based, flexible digital problem-solving skills for current technologies and ongoing technological shifts.

Acknowledge the varied experiences in early career skill building and potential limits that may have been experienced, particularly for Black and other workers of color. This will provide space for establishing a foundational base of knowledge.

Consider the more human aspects of workers and external factors that impact their overall well-being to retain talent and help workers feel acknowledged, valued, and connected to organizations, such as access to mental health services, child care services, and assistance for single parents.

Provide space and funding for initiatives such as affinity groups, through which individuals can connect on the basis of common interests, experiences, and/or identities. Create safe spaces for affinity groups to exist within the workplace to contribute toward workers' sense of belonging and inclusion, as well as provide opportunities for professional development, networking, increasing cultural awareness, and collective voice. See Table 6, Example Tech Affinity Group Resources.

Table 6: Example Tech Affinity Group Resources

Black Women in Tech • Baddies in Tech • Black Female Founders • Black Girls in Tech • Black Women Talk Tech • Coding Black Females	**Black LGBTQIA+ in Tech** • Back Stage Capital • Pride Fund 1 • Trans*H4ck • TransTech Social Enterprises
Additional LGBTQIA+ Tech Organizations • Lesbians Who Tech & Allies • LGBTQ in Technology Slack • LGBT Tech • Maven Youth • Out in Science, Technology, Engineering, and Mathematics (oSTEM) • Out in Tech • Out to Innovate • Pride in STEM • Write/Speak/Code	**Dis/ability in Tech** • Blind Institute of Technology (BIT) • Chronically Capable • Disability StartUP Network-2GI • Disabled Techies Slack • Illimitable • Open Sourcing Mental Illness (OSMI)

Furthermore, additional linked organizations that provide a variety of the aforementioned supports for Black learners and workers entering, advancing, and transitioning across technology career pathways are included in **Table 7**:

Table 7: Additional Organizations Providing Various Tech Pathway Supports

• 1863 • America on Tech • American Association of Blacks in Energy • Apprenti • Association for the Advancement of Artificial Intelligence • Augustus Redefined • B-360 • Base 10 • Baddies in Tech • BITWISE Industries • BlackGirlsHack • Black & Brown Founders • Black Code Collective • Black Cybersecurity Association • Black Data Processing Associates (BDPA) • Black Female Founders	• Black Founders • Black in AI • Black Professionals in Tech Network • Black Product Managers • Black Tech Jobs • Black Tech Nation (BTN) • Black Tech Pipeline • Black UX Labs • Black Women in A.I. • Black Women in Stem 2.0 • Black Women in Product • Blacks in Cybersecurity • Blacks in Technology • Blacks United in Leading Technology (BUiLT) • Blackswho.design • Breakline • Brown Girl Tech World	• Byte Back • CODE2040 • Code Crew • CodePath.org • <Coding Black Females/> • Color <Coded> • Color Stack • COOP Careers • Cyversity • DevColor • DigitalUndivided (DID) • Dream Corps Tech • Empow(H)er Cybersecurity • Eskalera • ExpandAI • General Assembly • Generation USA	• Hack Diversity • Hack the Hood • Hatch • HBCUvc • #HIREBLACK • ImBlackinTech • Information Technology Senior Management Forum (ITSMF) • International Consortium of Minority Cybersecurity Professionals • Jopwell • Kanarys • Landit • Minorities in Cybersecurity • MLT • National Action Council for Minorities in Engineering (NACME) • National Society of Black Engineers (NSBE)	• NOIREFY • NPower • Onramp • Opportunity Hub • Opportunit@Work • Per Scholas • PM while Black • Praxis Labs • Pursuit • ReBoot Representation • Resilient Coders.org • SheDesigns • Sirius XM + Pandora • Skillful • Synack Academy • Tech Impact • Tech Bridge	• Techtonica • The Black UX Collective • The International Organization of Black Security Executives (IOBSE) • The Marcy Lab School • The Mentor Method • Tribaja • VSchool • Valence • Wall Breakers • Where are the Black Designers? • Women in Security and Privacy (WISP) • Women's Society of Cyberjutsu (WSC) • Workday • Year Up • YearOne

Next Steps: The Path Moving Forward

Black learners and workers need to be equipped with the digital tools, skills, and opportunities to traverse an ever-changing, increasingly tech-driven economy. To continue raising awareness and developing targeted strategies that address the underrepresentation of Black learners and workers within the technology industry, it is essential that educational institutions, employers, workforce development agencies, and policymakers provide Black learners and workers with the skills necessary to successfully navigate the technology learning and workforce ecosystem and beyond.

Although percentages of Black talent across the technology workforce have remained stagnant as a result of historical inequities across various areas, opportunities exist for companies and policymakers to create and implement policies and initiatives that dismantle the barriers that impede Black learners and workers from entering, navigating, and persisting within technology careers. As we have seen throughout this landscape, there are many examples of innovative actions that employers, postsecondary educational institutions, policymakers, advocates, and organizations are currently undertaking in an effort to address inequities that Black learners and workers may face within the technology learning and workforce ecosystem.

SUMMARIZED RECOMMENDATIONS & INITIATIVES ACROSS THE TECHNOLOGY LEARNING & WORKFORCE ECOSYSTEM

- **Partnerships between local, county, and state workforce development agencies and postsecondary education and training providers (e.g. universities, libraries, community colleges, CTE programs) to fund digital skills training can equip Black learners and workers with workplace competencies that are essential for the current labor market.**
- **Employers can take proactive measures to ensure that entry and navigation of employment are void of digital, physical, financial, and social barriers by following recommendations provided by entities such as the Institute for Career Development, Mckinsey & Company, and Kapor Center, who each provide guidance on supporting intersecting identities within tech. In doing so, employers can more effectively promote accessibility, inclusivity, and support efforts in the recruitment and retention of Black learners and workers within tech.**
- **Long-term investments in mentorship, social capital, networks, and wraparound services from postsecondary education and training providers and technology employers can support Black learners and workers entering and persisting in tech.**
- **Given that the number of coding related technology careers will decrease due to automation, it is important that technology industry contributors also fund and support high-quality education and training opportunities that can lead Black learners and workers to successful non-coding career pathways as well. Personalized career support programming can assist Black learners and workers in navigating job placement and marginalization.**
- **Advocating for data transparency (e.g., releasing employee diversity data) and accountability measures across every organizational level can help build awareness of barriers, retention, and attrition disparities facing Black learners and workers within the technology learning and workforce ecosystem. Advocacy groups, including the Congressional Black Caucus have pushed for solutions, such as the African American Inclusion Plan, that provide specific and measurable steps that could help to address the inclusion and retention of Black Americans within the technology industry.**

As we continue to examine pathways into and across the technology learning and workforce ecosystem, we recognize that the experiences and perspectives of learners and workers' exploration and exposure to technology careers is often missing. Initiatives and programs designed to engage and support Black learners and workers in entering and persisting in the tech sector do not always take into account the systemic and structural barriers and supports Black learners and workers experience from early childhood and beyond. In fact, recent data also shows that Black Millenials and Gen Zers are more likely to view the tech sector as exclusive, and Black learners and workers looking to change careers prefer short-term courses to traditional higher education. While there are non-degree educational and training pathways to technology careers that may assist learners and workers with overcoming challenges related to time and access, which we have shared through this report, there are still financial burdens and predatory practices that influence the rate at which Black learners and workers are able to enter the technology field. Lack of tuition scholarships for bootcamps, fair wages from apprenticeships, and strong alignment between stated goals and outcomes of alternative education providers preclude Black learners and workers from breaking into tech.

To strengthen our understanding of what supports and skills Black learners and workers pursuing non-four-year degree credentials in technology need to achieve successful outcomes within technology career pathways, Digital Promise will first utilize interviews and focus groups to center the individual and collective perspectives and experiences of Black learners and workers in ways that raise awareness about the state of Black workers in the technology industry, programs, services, and supports that effectively promote success across technology career pathways. Within these sessions, participants may discuss their technology career pathway successes, supports, and challenges related to their technology exposure and exploration, postsecondary education and training, job seeking, career entry, advancement, and/or attrition. Digital Promise will then lead inclusive design sessions with workers to generate recommendations for supporting successful careers in technology, based on lived experiences, insights, and challenges of Black current and prospective workers. Through this research, we aim to impact employers as well as education and non-degree training programs, resulting in a better understanding of how to provide more robust incentives and services to Black learners and workers in the technology sector.

In conclusion, this landscape scan highlights various systemic and structural barriers that challenge Black learners and workers from persisting in a rapidly transforming digital economy and society. Through this examination, this report also discusses recommendations and resources that technology industry contributors, policymakers, and education and training providers can emulate to assist entry and transition across technology career pathways to be increasingly accessible and inclusive to Black learners and workers, including those with non-degree credentials. Although further efforts are warranted, increasing awareness and understanding of factors, skills, and supports that can sustain the persistence and retention of Black learners and workers are necessary to improve the representation of Black individuals in the technology workforce.

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