Lift Every Voice in Tech:

Co-Designed Recommendations to Support Black Workers and Learners Seeking to Enter and Advance in Technology Industry Career Pathways

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Digital Promise
Accelerating Innovation in Education

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About Digital Promise and the Pathways Team

Digital Promise is a global nonprofit working to expand opportunity for every learner. We work with educators, researchers, technology leaders, and communities to design, investigate, and scale innovations that support learners, especially those who have been historically and systematically excluded.

Our mission is to shape the future of learning and advance equitable education systems by bringing together solutions across research, practice, and technology.

Guided by three Impact Goals, we are working to ensure the following by 2031:

1. 75% of historically and systematically excluded learners in America are learning in education systems with the knowledge and tools to create the conditions for them to succeed.
2. 30 million historically and systematically excluded learners have sustained and meaningful experiences of Powerful Learning, putting them on a path to postsecondary completion.
3. 30 million historically and systematically excluded learners are enabled to achieve postsecondary credentials that offer economic security, well-being, and agency.

The Digital Promise Pathways Team employs research and design efforts to ensure historically and systematically excluded adults have **equitable access** to **pathways and tools** that will **advance their skills** and help them achieve **economic security**, **agency**, and **well-being**.

Executive Summary

While we've seen an expansion of career pathways into the technology industry, research has shown us that **access to these pathways** and the **supports** for the **recruitment, retention, and advancement** through technology careers simultaneously **remain inequitable for Black talent** due to various systemic barriers. To help address this issue, this project focuses on **elevating the voices and lived experiences** of Black workers and learners who are seeking to enter and/or advance in the technology industry, with the purpose of **building awareness** to the:

1. **challenges** and **barriers** they face navigating the U.S. technology learning and working ecosystem;
2. factors such as **supports** and **services** that have facilitated their technology career pathway entry, retention, and advancement, and;
3. **collaboratively designed recommendations** for needed supports that they've identified that can better **promote successful navigation** and **persistence** within technology career pathways.

This report further highlights **action steps** that various technology industry contributors can take to **increase access** to non-four-year degree pathways to tech careers, as well as **dismantle systemic barriers** within the technology learning and workforce ecosystem. It is necessary that employers and training providers **continuously listen to, acknowledge, and respond** to the needs and experiences of all workers and learners. We call for **more partnerships and collaborative efforts** between employers and education/training providers with the **continuous inclusion of workers and learners at the center**. The **iterative design and implementation** of these suggestions for groups who have been historically and systematically excluded from economic mobility opportunities (such as Black workers and learners) will essentially foster sustainable industry changes that 1) increase the level of access to technology career pathways, 2) promote talent retention and economic advancement, and 3) cultivate inclusive technological innovation and global competitiveness overall.

Project Overview

Introduction

The current progression toward a ubiquitous digital society and economy has led to the emergence of a diverse array of career pathways and education and training programs to enter the technology industry. In particular, the growing availability of career opportunities in non-coding technology career subfields (e.g., cybersecurity, user experience design) has expanded onramps for entry and advancement in the technology learning and workforce ecosystem. Despite these advancements, the recruitment of diverse talent, notably Black learners and workers, continues to be disproportionately impacted in comparison to many other populations (Goins, Koshy, Scott, Payton, Cobb, Lundgren, & Toldson, 2022). Further, despite the persistent and pronounced inequities embedded in the technology learning and workforce ecosystem, research on strategies and opportunities for mitigating the impact of systemic and economic barriers for historically and systematically excluded groups (such as Black learners and workers) entering and advancing in technology careers remains scarce. To help mitigate these challenges, this report presents research and recommendations that are collaboratively designed at the margins, centering the experiences of one of the most marginalized groups (i.e., Black workers and learners) within the technology learning and workforce ecosystem. By researching and designing at the margins, we take into account a wider range of learner and worker needs, which can ultimately lead to solutions that can be beneficial to all.

Background

In our recent landscape report, *Understanding the Supports and Skills that Enable Successful Pathways for Black Learners and Workers into Non-Four-Year Degree Technology Careers: A Landscape Scan*, we outline and expand on the systemic and structural barriers (e.g., discriminatory institutional policies and practices, racial profiling, and zoning laws) that have impacted social and financial capital access and mobility, educational and training opportunities, opportunities related to career entry, advancement, and retention in the technology workforce for Black learners and workers. Workers of color are disproportionately affected by digital skill gaps compared to their white peers, in large part due to structural factors that result from long-standing inequities, such as disparities in income and educational attainment. The effects of these disparities are further compounded for Black learners and workers with intersecting identities, (e.g., gender, dis/ability[1], immigration status, etc.). For example, Black immigrants have a 54% higher chance of underemployment compared to their white peers, regardless of their prior educational and skill development experiences. The report also unveils promising strategies for increasing equitable opportunities for the inclusion, retention, and advancement of Black learners and workers across the U.S. technology industry. Postsecondary institutions and programs have developed non-four-year degree educational and training pathways, such as career and technical education (CTE) programs, community colleges, and apprenticeships, that are increasing educational accessibility and affordability and can equally provide skills-based training and credentials that can lead to high-paying jobs and successful career mobility.

1. Dis/ability: The intentional spelling of the term “dis/ability” is used to counter the connotation that “disability” may bring (i.e., The spelling without the slash identifies a person by what they are not able to do. Using the slash in the spelling conversely represents individuals by what they are capable of doing) (Annamma, Connor, & Ferri, 2013).

Digital Promise embarked upon an inclusive research project in collaboration with Black learners and workers in non-four-year degree technology career pathways and non-four-year degree program leaders to gain a better understanding of 1) how Black learners and workers are best supported in entering and advancing within non-degree career pathways in technology and 2) the skills and supports that lead to greater success with career and economic mobility. We shifted the conversation to Black learners and workers in the industry to learn more about specific factors, skills, and/or supports that helped sustain their motivation and persistence in pursuing non-degree credentials in technology. By centering the experiences of Black learners and workers, we aim to impact the recruitment, retention, and advancement of Black learners and workers in the technology learning and workforce ecosystem and to make real progress in increasing representation, diversity, and equitable practices in the tech sector. Through our findings and recommendations, this research stands 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.

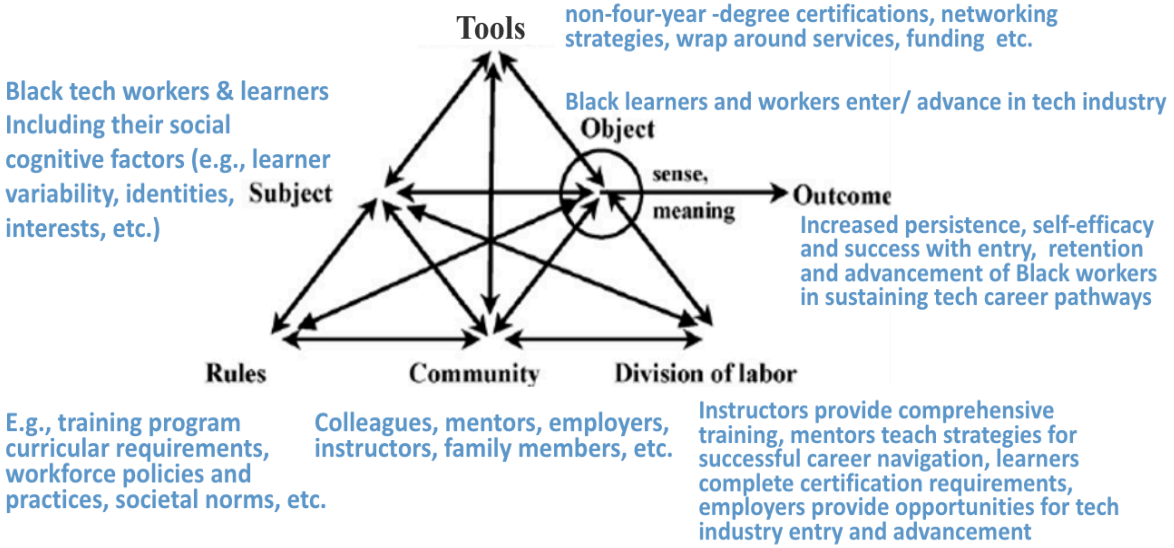
Conceptual Framework

Social Cognitive Career Theory (SCCT) is used as a framework to ground our conception of how social cognitive factors (e.g., learner variability and learning experiences) and contextual affordances (e.g., employer practices, industry trends, policies, systemic barriers, etc.), play a significant role in academic and career development (Lent, Brown & Hackett, 2002). Following the Lent et. al (2002) SCCT model, we examine lived experiences of career development to see what factors appear salient for self-efficacy, persistance, and perceived barriers to career development and occupational outcomes in the tech industry. This work additionally builds on research investigating turnover intention of underrepresented populations within the technology workforce (Carayon, Schoepke, Hoonakker, Haims & Brunette, 2006) to help us identify additional factors (e.g., organizational and career experiences, quality of working life, training opportunities, discrimination, career support and advancement, flexible work practices, etc.) that further have an impact on the persistence of individuals navigating technology career pathways.

Finally, this work utilizes Cultural Historical Activity Theory (CHAT) (Vygotsky, 1978; Engeström, 1987), which is a theoretical framework that helps us to understand and analyze the relationship between individuals, such as Black tech workers and learners, as well as the contextual environment (including the cultural, historical, and social aspects) and how that all influences the activity of navigating tech career pathways. Figure 1 illustrates how CHAT can be used to identify various mediators of activity (e.g., the tools, rules, community, division of labor, the object, or activity goal) and how all these mediate (or afford/constrain) how Black tech workers and learners may work toward achieving their tech career pathway goals.

Figure 1

Activity System Representation within a Technology Career Pathway Context



Note. This CHAT activity triangle is adapted from Engeström (1987).

The present study adds to this literature by 1) identifying features of education/ training programs and workforce practices that support the academic and career development of Black learners and workers in technology career pathways, as well as 2) examining the specific impacts of affording factors and constraining barriers on Black workers and learners within the technology education and workforce ecosystem. The following research questions guiding this study are as follows:

1. What factors serve to facilitate the persistence of Black workers and learners in technology career pathways?

2. What academic and career supports exist for Black workers and learners in the field of technology?

Methodology

This report is the final phase of a two-part project. This phase of work is based on our previous phase one findings, which involved conducting a landscape scan of the technology learning and workforce ecosystem using scoping review (Arksey & O'Malley, 2005) methodology. During phase one, we extensively searched through databases and organizational websites to compile comprehensive lists of existing programs, services, and supports aimed at promoting economic mobility for individuals following non-traditional pathways. Within this compilation, we highlighted initiatives designed to facilitate the entry and advancement of Black workers and learners in technology careers, which laid the foundation for garnering further insights from current tech workers and learners within the subsequent phase two of this project.

To reach Black workers and learners who were seeking to enter and/or advance within the tech industry, the research team partnered with various non-four-year degree credentialing programs that

assisted with the recruitment of individuals of interest. With the distribution of recruitment materials (e.g., interest flyers, registration forms, emails, social media posts, etc.) through the programs' networks of learners and workers, we garnered 70 individuals of interest to participate in: 1) either an interview or a survey, and 2) an inclusive design session. Over the course of several months we engaged with these learners and workers (see Figure 2 for geographic representation of participants) to develop a holistic understanding of their lived experiences as they navigate tech career entry and/or advancement through pathways involving the use of non-four-year degree credentials such as certifications, apprenticeships, bootcamps, etc.

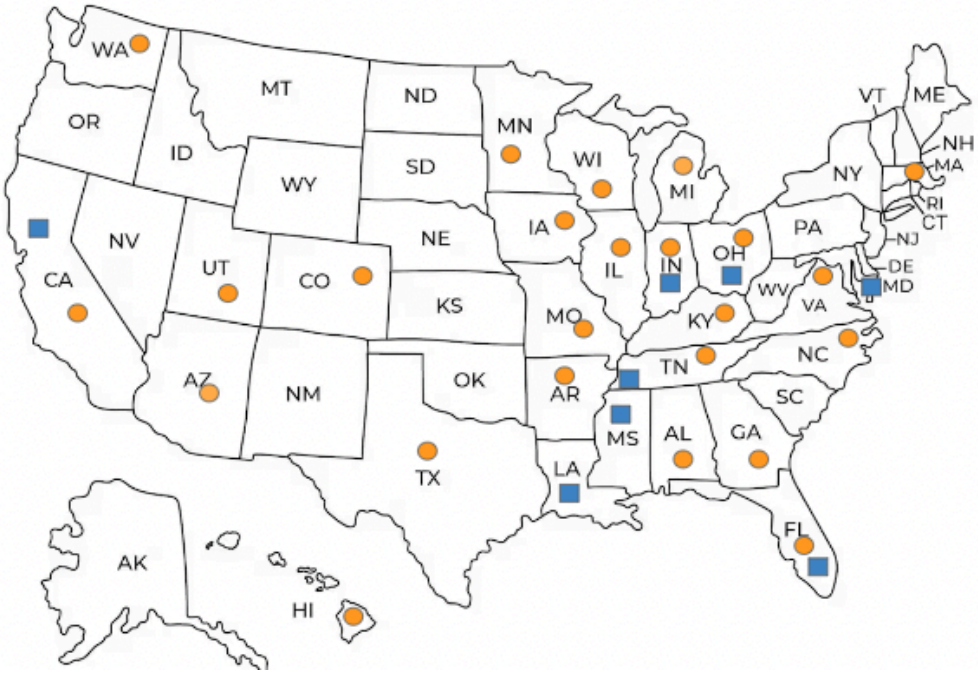
To get an in-depth view of their perspectives and journeys, we invited participants to share their experiences via virtual one-on-one, semi-structured interviews (60 minutes each) or through a qualitative, open-ended response survey. Through these avenues, we asked participants to describe their 1) identity (e.g., job title and description, location, personal and work identities, student enrollment status, etc.) and their perceived impact of identity within the tech learning and workforce ecosystem, 2) the challenges and opportunities they have experienced thus far within their learning and career pathway, as well as 3) ideal/wished for supports they feel they would need to be successful while navigating the technology industry. Questions related to pathway challenges, opportunities, and wishlist of supports were separated based on aspects of learning and career pathways (i.e., 1) gaining awareness and exploring the technology industry, 2) education and training, 3) recruitment and hiring, 4) career entry, 5) career advancement, and 6) career retention).

Participants were also invited to engage in one of three virtual inclusive co-design sessions (90 minutes each), where space was provided for multiple learners and workers to learn with and from one another's individual and shared tech learning and working experiences, opportunities, challenges, and supports, so that they could then collaboratively design a set of ideal technology career pathway solutions. Participants utilized shared Google Jamboards to capture their collective experiences and collaboratively ideate around their ideal solutions. Their goal was to generate meaningful recommendations that employers, training providers, policymakers, and technology-focused organizations can advocate for and/or implement to help remove barriers and increase access to economic mobility opportunities, resulting in successful technology career pathways for historically and systematically excluded learners and workers in the technology sector and beyond.

Furthermore, we held four small group interview sessions with program representatives and leaders (e.g., administrators, employer liaisons, program developers, etc.) from six non-four-year degree credentialing programs (see Figure 2 for geographic representation of participants) that specifically work toward enabling learner and worker entry and advancement in technology industry related careers. The goal of these sessions was to build awareness and understanding of the tools, resources, and/or supports that these programs provide to help Black learners and workers successfully navigate and persist in technology career pathways. Discussion questions pertained to having participants describe 1) strategies they use to raise awareness of tech careers and recruit Black workers and learners to their programs, 2) program features that enable learners' successful navigation of career entry and advancement obstacles, 3) funding opportunities, policies, and other resources that facilitate and/or constrain their support of workers' and learners' tech journeys, and 4) their perspectives of how to support the advancement and persistence of Black learners and workers through current technology industry trends.

Figure 2

Geographic Representation of Where Participants are Located Across the United States



Note. Orange circles represent the learners and workers who participated in interviews, a survey, and/or design session. Some circles represent multiple participants (e.g., Alabama (2), California (10), Colorado (2), Florida (8), Indiana (4), Michigan (8), Minnesota (2), Texas (5), Virginia (2)). Blue squares represent the non-four-year degree technology program leaders who participated in small group interviews.

Data Analysis

One-on-one interviews (18), small group interviews (4), and design sessions (3) were all video recorded via Zoom and later transcribed by professional transcription services (i.e., TranscribeMe!). We collected 168 survey responses via Qualtrics; 50 of these responses were found to be viable and were exported for analysis. Responses were excluded based on factors such as selected race (i.e., if participants did not identify as Black) and quality of responses (i.e., automated internet bots may have filled out items with random characters/non words, all no's, all yeses, or duplicate submissions). Survey responses were summarized for all participants as a single group as well as separately for learners and workers.

Session transcriptions and open-ended survey responses were iteratively coded and reflected upon by multiple Digital Promise researchers. The team first utilized deductive coding to map participant responses to a priori codes developed from the basis of our phase one landscape scan findings, which relate to challenges, barriers, opportunities, and supports across a learning and career pathway (i.e., 1) gaining awareness and exploring the technology industry, 2) education and training, 3) recruitment and hiring, 4) career entry, 5) career advancement, and 6) career retention). Each participant artifact was coded and triangulated by two researchers to establish coding consistency and validity of findings. Next, deductive coding was used to identify emergent codes. Thematic analysis (Braune & Clark, 2006) was then used to identify patterns across the data, and subsequently, themes across participant responses.

Findings

Findings Overview

The report findings are organized into three sections:

Part 1: Black Voices of Tech (Navigating Non-Four-Year Degree Tech Career Pathways). This section captures the essence of who Black learners and workers are in the tech industry and introduces a broad view of what non-four-year degree career pathways may look like for Black learners and workers in the tech industry. This section also identifies common challenges, barriers, and opportunities that many Black learners and workers may currently face within their tech career pathway.

Part 2: Reaching Success in Tech: Co-Designed Recommendations. This section foregrounds how workers and learners perceive success and what they believe is needed to achieve success within the tech industry. This section further highlights their wishes for and recommendations of resources and supports that can help facilitate Black workers' and learners' successful navigation of the technology learning and workforce ecosystem.

Part 3: Can You Hear Me Now? Insights from Non-Four-Year Degree Program Leaders. This section highlights the following:

1. Descriptions of program features that facilitate non-four-year degree pathways to tech careers.
2. Example opportunities and challenges some programs face in supporting Black workers and learners.
3. Program leader insights with current tech trends and advancement as it relates to workers and learners in non-four-year degree pathways.
4. Program leader thoughts and ideas based on the worker and learner co-designed recommendations.

Part 1: Black Voices of Tech

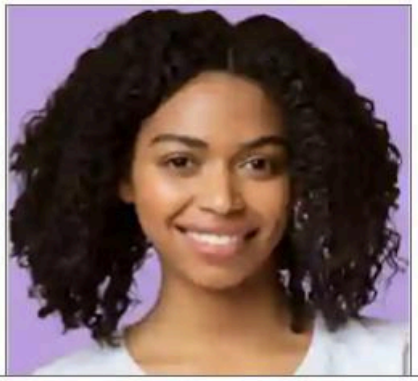
(Navigating Non-Four-Year Degree Tech Career Pathways)

To develop an understanding of how to more successfully support Black workers and learners as they navigate tech career pathways, we first sought to learn about the lived experiences (including the cultural, historical, and social factors) that were influential in getting workers and learners interested and started on their journey in tech. Through analysis of interviews, surveys, and design session participant responses, this section captures the essence of who Black learners and workers are in the tech industry and introduces a broad view of what non-four year degree career pathways may look like for Black learners and workers in the tech industry. This section also identifies common challenges, barriers, and opportunities that many Black learners and workers may currently face within their tech career pathway.

Below we highlight two user personas (created on the basis of our gathered real-world data) that help to provide meaningful representations of who our Black tech workers and learners participants are, how they may be currently situated in their tech career pathway, and the broader needs of pathway supports for Black workers' and learners' navigation of the tech industry.

Alana Washington

AGE 28
OCCUPATION Cybersecurity
STATUS Married
LOCATION Detroit, MI
VERTICAL/TIER Worker



"I was unemployed at the time (2022), [and I kept] hearing cybersecurity. I'm just going to take a chance and do it. I [felt] like it would contribute to the betterment of my mental health and job security."

Motivations

- The flexibility to work remotely, save, and travel
- Family encouragement and extensions of networks
- Support system and community provided by participating in a non-four-year degree program
- Apprenticeship opportunities at Boeing to pursue interests in governance, risk, and compliance
- Access to Linkedin Premium to network more effectively
- Access to fully sponsored certification courses

Goals

- Advance skill set in cybersecurity or IT auditing
- Increase confidence in networking and public speaking
- Better advocate for better pay for herself
- Improve work/life balance
- Be financially stable and able to support family

Background

Alana works in the cyber/information security space. She is relaxed, driven, and enjoys talking to people and learning as much as she can outside of traditional institutions. She's always been interested in tech, opting to help fix/set up electronics in her family home. She found cybersecurity after being unemployed and was interested in the potential job security.

Frustrations

- Evident pay gap between traditional (four-year degree) vs. nontraditional experience (i.e. certifications)
- Entry-level roles require unaffordable credentials
- Low entry-level compensation
- Lives 1.5 hours away from her job

Experience

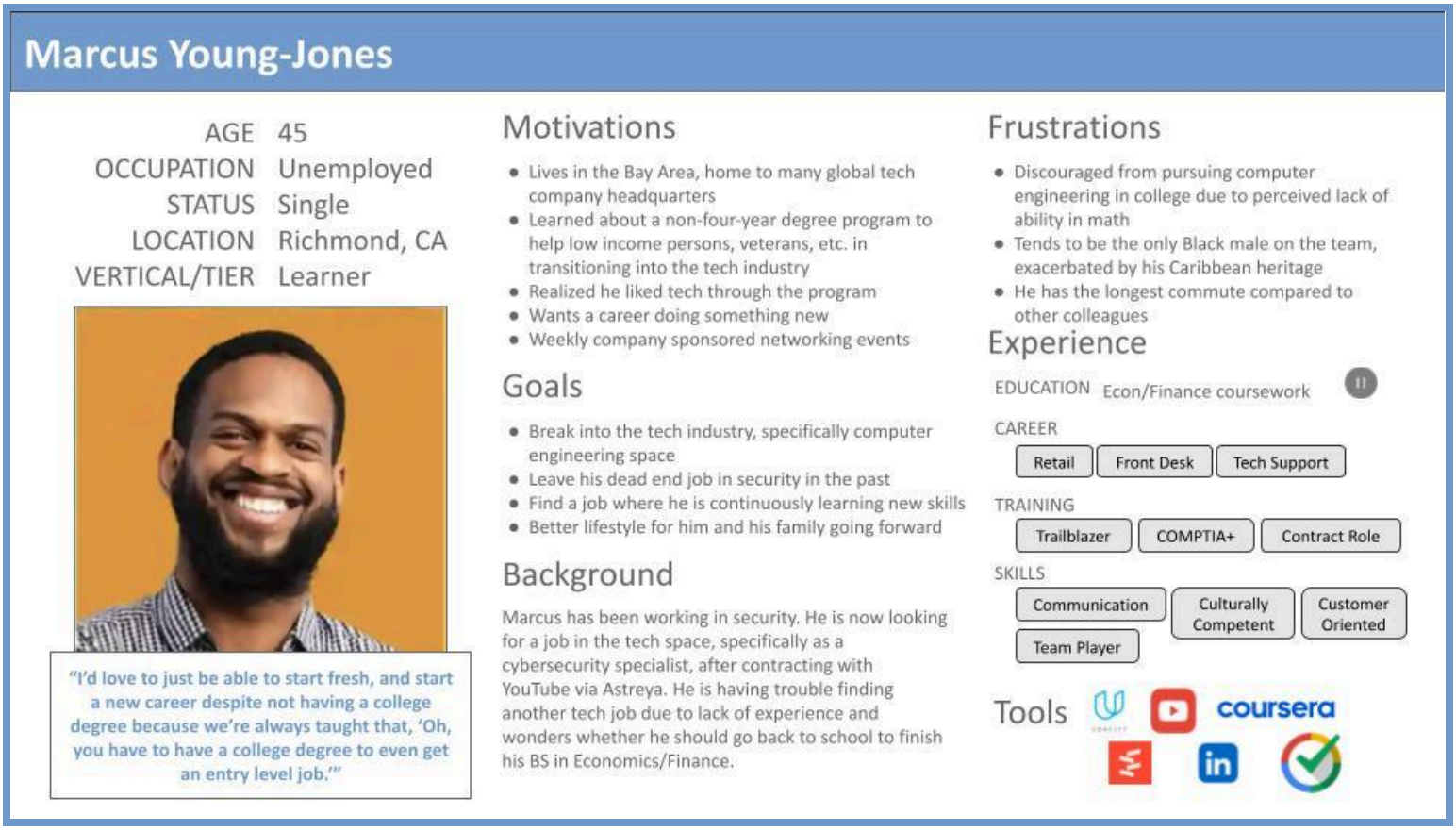
EDUCATION BA, Criminal Justice

CAREER
Cybersecurity

TRAINING
A Plus Cert | COMPTIA+ | Contract Role

SKILLS
Research | Analysis | Data Visualization | Excel | Team Player

Tools nPower, coursera, Tik Tok



Alana and Marcus embody the pathway experiences that many of our workers and learners expressed to have. In the following sections, we summarize the learning and career opportunities, or facilitating factors, that participants have had that influence their motivations and goals related to a career in the tech industry. In doing so, we showcase the possibilities and impact of non-traditional pathways and how they can provide additional career pathway onramps and supports for workers and learners to successfully navigate the industry. Following, we bring awareness to the challenges which lead to the experienced frustrations that our participants face along their pathway.

Opportunities: Pathways Into the Tech Industry

Awareness and Exploration of Tech Pathways and Resources

Many participants claimed to have always been interested in the tech industry. Family, friends, and outreach communications exposed them to careers in tech. Five central themes concerning tech exposure emerged from the conversations:

1) A level of interest in tech before adulthood (e.g., due to a drive to do something innovative and/or a love of fixing things)
2) The influence of friends and family who have an interest in or work in tech
3) Recruitment into the tech industry by social media or other marketing techniques (e.g., Twitter, LinkedIn)
4) Position shift at their place of employment which exposed them to tech
5) Seeking a career change during the COVID-19 pandemic

Participants also outlined compelling opportunities that motivated them to seek a pathway toward tech. For instance, non-four-year degree credentialing programs that provide opportunities such as training opportunities, in-person networks, interview preparation, job placement support, and tutoring were influential with motivating participants. Additionally, support from school personnel or mentors (e.g., professors, tech professionals, or consultants) to pursue tech helped to solidify participants' interest in tech. This type of support let participants know about potential benefits of the industry such as flexible working conditions (e.g., working from home), social and economic mobility, and proper training opportunities.

Tech Career Exposure Opportunity Examples		
In-person networks: - Friends/colleagues/family who work in tech - School personnel (influential instructors, tech professionals, or consultants) - Training and credentialing programs geared toward the tech industry - Attending tech mixers, hackathons, tech conferences, and meetings - Mentorships (e.g., TalentStacker)	**Media influence:** - News outlets (specifically coverage about how lucrative tech is currently or the popularity of work from home) - Targeted advertisements via Youtube, LinkedIn, Social Media, etc. - Seeing diverse representation within companies - Exposure to subfields of the tech industry	**Online social networks via:** - Social media (e.g., information sharing by influential people in tech like Symone Beez, Twitter, Facebook, LinkedIn) - Online community postings, forums (e.g., Reddit), and webinars - Online community groups and membership organizations (e.g., Black tech affinity groups via LinkedIn, Baddies in Tech, Elpha, Blacks in Technology, OneTen, etc.)

Educational and Training Opportunities

While some participants mention that the pursuit of formal technology related degrees helps to provide solid foundations for tech careers, many participants expressed that having a four-year degree is not necessary to get into tech. There are multiple pathways to get to what you want to do. Below we highlight what participants have identified as beneficial features and the impact of non-four-year degree credentialing education and training programs on their learning and career pathway development.

Example Beneficial Program Features and Resources
Career and Skills Development ● Free- or low-cost continuing education/training to the public (e.g., certifications, Python, Excel, CompTIA security+, etc.) ● Opportunities to develop tangible skills (e.g., vocational skills through apprenticeships) ● Career counseling and guidance ● Career advancement resources/upskilling programs such as IT certifications, resume writing

assistance, online mock quizzes, college courses, etc.
- Exposure to online learning platforms (e.g, Coursera, Clicked, Udacity, Udemy, Khan Academy, saasguru, govtech, servicenow NextGen, Trailblazer, Youtube, etc.) and company websites which can provide soft and tangible technical skills development
- Access to bootcamps and internship programs that offer hands-on experience

Network and Connection
- Provides a support system of like-minded people and brings together community
- Provides tutoring, networking, and exposure to career opportunities
- **Collaborative partnerships with:**
    - Credentialing organizations that place a focus on diversity and inclusion
    - Organizations, such as TechBridge, that provide IT consulting and outsource services to hundreds of nonprofits
    - Local workforce development offices
    - Career Karma
    - Referral program networks**,** temp agencies, recruiters, nationwide tech employer partners
    - Mental health support providers

Accessible and Inclusive Program Format
- Online and flexible scheduling
- Time for exploration of real career opportunities
- Supports different ways of thinking/comprehension abilities and provides multiple modalities for learning
- Scholarships, grants, or other financial support to attend program(s) at no or low cost
- Balancing an integration of technological resources and holistic well-being support

Employment Opportunities
- Opportunities for gainful employment and targeted career development

Accomplishments Through Tech-centered Education/Training Programs

Participants noted that accomplishments gained through their education/training experiences contributed to learning industry knowledge, understanding tech roles and requirements, receiving hands-on experience, learning how to troubleshoot tech, making new connections, earning certifications (i.e., Google IT), gaining employment, affording to live in a new neighborhood, increasing salary, and sharpening coding skills. We categorize these accomplishments within the following themes:

1. Career Transition and Experience - Participants gained hands-on experience while completing their training and participated in collaborative initiatives. This resulted in some participants transitioning into new careers and environments, such as from manual labor to a tech role. Some mentioned that they have had a significantly positive change in their life path. Others were even able to fulfill their dreams of becoming financially stable and move into a different neighborhood.

Overall, many participants experienced unexpected career transitions, surpassing initial perceptions or perceived barriers. This insight includes stories of transitioning to project management, becoming team

leaders, and stepping into tech roles without conventional academic qualifications. The unexpected opportunities showcase the potential for diverse and non-linear career trajectories.

2. Growth and Networking - Participants mentioned that their training equipped them with the knowledge to be able to network effectively on LinkedIn and build connections that have had an impact in their ability to find positions in tech after the completion of their programs. That networking has led to numerous career advancement opportunities, such as pursuing more certifications, taking on positions within their programs, landing senior-level positions, and increasing their salaries.

3. Certifications and Skills - Participants gained a plethora of certifications from Google IT to CompTIA to ITF+ and passed many certification exams. They also mentioned enhancement of technical skills (e.g., learning SQL and Power BI) and the development of in-depth industry knowledge needed for specific roles.

4. Financial Gains -

- Several participants discussed having increased salary or potential for increased salary due to their education/training program participation. Some participants indicated that their career in IT did not necessarily lead to financial gains immediately. While they appreciate the consistent paycheck and better benefits, the financial aspect is still a work in progress. The transition from hourly to salary employment has brought increased financial stability and flexibility, but the financial impact seems to be a gradual process.

- Several participants expressed their appreciation for the ability to work in different locations during vacations. Moreover, obtaining skills through non-four-year degree programs is seen as a pathway to securing significantly better-paying jobs, emphasizing the potential for ongoing professional growth.

- Several participants achieved significant financial milestones, such as making down payments for houses.

- Several respondents who are still full-time students or those looking for employment now noted no financial gains from their programs just yet.

5. Social Gains - Most participants noted making personal and professional connections, attending conferences, and having a good working and or learning culture. The participants reflected on the impact of their experiences, particularly through non-four-year degree programs centered on facilitating tech career entry. Professionally, they've encountered diverse individuals (e.g., at nonprofit conferences and other events) and enhanced their networking skills, some by amassing more than 100 LinkedIn connections. Some programs actively involve participants in events, creating a supportive community that extends even to family gatherings. The newfound freedom allows for increased social engagement, contrasting with some of their previous rigid work schedules. Overall, the participants express gratitude for the multifaceted support received through these programs.

6. Personal Gains and Growth - Participants noted a range of personal gains and growth including, flexibility in location while working remotely, gaining confidence, adaptability, the desire to continue learning, increased quality of life, and improving communication skills.

- The top cited personal gains from the participant responses include a substantial boost in knowledge and exposure to new concepts through the acquisition of certifications, creating a newfound desire to learn more about technology and recognizing the benefits of a career in the field. On a personal level, there is a significant focus on self-improvement, with participants expressing that they have learned to give themselves grace, manage stress, set boundaries with technology use, communicate better, and gain a deeper understanding of themselves and others. A couple of participants mentioned overcoming age-related stereotypes and adapting to new technologies.

- The opportunity for travel and exposure to different working environments, such as Google's office in Toronto and Silicon Valley, is also highlighted as a valuable personal gain. Additionally, some participants mention the positive impact of their programs, contributing to social and personal growth, enhanced confidence, and an improved quality of life through remote work flexibility and better schedule management.

7. Professional and Skill Development - Several participants experienced notable professional advancements, like becoming fellows, keynote speakers, and team leaders. Participants also highlighted the development of practical skills and their direct application in daily life or professional settings. Participants shared experiences of gaining IT general knowledge, improving interview and conversational skills, and applying newfound technical abilities to personal tasks, showcasing the immediate tangible impact of their training.

Challenges: Barriers Along Tech Pathways

While participants experienced various opportunities that supported aspects of their tech learning and career pathway, participants also revealed key challenges (e.g., constraining barriers and frustrations) related to gaining awareness of and exploring tech careers, gaining education/training, navigating the recruitment and hiring processes, as well as career entry, advancement, and retention. Within each aspect of a career pathway, we categorize these challenges within the following themes:

Awareness and Exploration of Tech Pathways and Resources

1. Geographical area influence on tech presence and exposure to tech diversity
2. Limited social network, connections, and guidance on tech industry
3. Limited opportunities to explore tech industry products and careers

Many participants expressed that they did not become aware of the breadth and depth of tech industry knowledge, required skills, and opportunities until much later in life (e.g., when some form of tech was required for work-related tasks). Factors contributing to this included participants not seeing diverse representation of the tech industry within their geographic location and/or amongst their social networks (e.g., lack of tech career related mentorship/guidance). Participants also mentioned that not having opportunities to be exposed to different aspects of the tech industry in school (e.g., no tech-related course/program offerings available in their district/ town, limited access to quality learning

resources within urban communities, etc.) limited their ability to explore the various pathways that the tech industry has to offer. These awareness and exploration barriers then lead many participants to experience challenges, such as having limited knowledge of tech terminology, not knowing where to start when transitioning to tech from another industry, and feeling overwhelmed by unclear pathways for tech industry career entry.

Educational and Training Opportunities

1. Difficulty of finding affordable educational/training resources
2. Some available educational/training resources are inaccessible
3. Challenge with garnered education matching their goals and/or tech industry market demand

Within participant responses, some cited how the cost of educational/ training (e.g., $15,000 bootcamps) coupled with individuals already experiencing financial struggles (e.g., managing child care and housing costs) make it difficult to upskill in tech. One participant mentioned how they opt to learn tech skills via YouTube because they can't afford the funds to attend bootcamps. Others mentioned how their education/training program had little to no training budget for technologists, making access to comprehensive/specialized training for specific skills difficult.

Even though some educational/training resources are available, some participants mention that they are still unattainable or inaccessible to them. For example, some participants cite the struggle of balancing caregiving responsibilities and/or work demands with education/training schedules (e.g., trainings may take place in different time zones or during work hours, maintaining focus during late program sessions while caring for sick family members is difficult, being late or missing program sessions increases risk for program expulsion, etc.). Inflexible learning formats (e.g., completely online courses with no in-person options or vice versa; instructors going through content too rapidly, one-size-fits-all training methods, etc.) and inaccessible resources (e.g., one-on-one tutoring for exam preparation or to combat test anxiety, poor internet connectivity) may have an impact on some learners' participation and engagement and can influence learners' and workers' retention in education and training programs. The lack of wrap-around support access (e.g., financial aid and services for housing, child care, and health benefits) makes balancing continued education, work, and families challenging and poses significant financial and emotional demands (especially for learners who are the sole breadwinner or provider for their family).

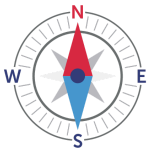
Finally, a common response from participants centered on the perception that the education and training that they did receive either did not align with their goals or did not fully align with the demands of the tech industry. For instance, some students may have had to take courses for tech sales and customer success when in actuality their career goal was based in cybersecurity.

> *"I learned after graduating school that certifications were important. I wish it was a school requirement so I could come out of school more prepared for the industry."*
> – Participant 007

> *"I had to rely on online resources, self study, and on-the-job experience to build proficiency in skills."*
>
> – Participant 020

Trouble Navigating the Job Market and Career Advancement

1. Unavailability of quality career resources provided by educational institutions
2. Limited professional networks and personal circles
3. Complicated job application, interview, and hiring processes
4. Entry-level job descriptions and years of experience mismatch



Within participant responses, we found that many Black workers and learners have limited access to professional social networks, tech job recruitment opportunities, and mentorship that can provide career guidance, support, and advice pertaining to the technology industry. In terms of key factors that have impacted their ability to successfully navigate the tech job market, our participants identified the following:

- One common factor pertained to **availability and quality of school resources**. Some participants mentioned how the school job fairs they had access to usually only had local brick/mortar stores or mom/pop shops represented, rather than tech jobs and companies. They struggled with finding opportunities related to career development within and outside of their attended schools.

- Another common factor related to having **limited professional networks and personal circles** connected to the tech industry**.** For instance, participants mentioned how they struggled with having limited LinkedIn connections that could potentially lead to tech job opportunities. Others expressed that these limitations factored into concerns about job security and limited advancement opportunities.

- Many of our participants expressed how **complicated and/or discriminatory job application, interviewing, and hiring processes** are. For example, some mentioned how there are biased ATS (or Applicant tracking system) disparities, where a resume sent through an ATS may get rejected, while their elaborate resume that they send directly to a recruiter by email is loved and accepted. To help overcome this barrier, some participants talked about the potential use of AI tools to help optimize their resumes, yet there is a challenge with finding the right tools to help increase their resume competitiveness. Others expressed concerns about being discriminated against based on color when listing their LinkedIn profile on job applications.

- Participants also talked about how hiring processes can be extremely lengthy, sometimes involving four to five interviews with no guarantee of getting a job. Others discussed how there's often a **mismatch between** how **job postings** may be **labeled as entry level**, yet the job descriptions often **require additional years of experience**. Participants commonly talked about

how they experienced recruiters and hiring managers not being straightforward. For example, applicants may have the basic qualifications for a job posting but lack the specific years of experience a particular company is looking for, or companies may prioritize candidates with formal credentials (rather than recognizing transferable skills garnered from alternative credentials), making it difficult to compete as a newcomer to the field. Some participants find themselves having to sacrifice compensation in order to obtain additional experience and/or education.

Perceptions About Impact of Identity in Tech

Participants expressed that experiencing the aforementioned challenges (especially when trying to compete within and navigate the rapidly changing demands of the tech job market) has resulted in feelings of imposter syndrome and feelings of not being qualified enough for jobs or higher-paying roles, even if they have the required credentials. Additionally, many participants shared sentiments about how the lack of Black representation in recruitment, employees, and management within the tech workforce can be discomforting (e.g., some participants mentioned experiencing microaggressions frequently).

Participants recognized the compounding effects that intersectional identities may have and how this can impact perceived visibility and validation within the tech industry. For example, a recurring theme of some participants who identified as Black women shared that in tech spaces they are often 1) not seen to be at the same level of intellect as men, 2) being overlooked when it comes to discussions, advice, and opinions, and 3) feeling the pressure of having to work harder because of their outward

appearance. Other participants with varying abilities mentioned the lack of accessibility supports present to meet the needs of those with dis/abilities.

Despite enduring multifaceted challenges, many participants emphasized the intrinsic motivation to keep learning in the dynamic tech industry, indicating resilience and a proactive approach to staying relevant within the industry. A participant mentioned that facing challenges showcased their determination and desire to succeed, emphasizing the importance of personal commitment alongside external support in overcoming obstacles and staying in tech. Overall, these responses illustrate the multifaceted effects of challenges, including potential setbacks, intrinsic motivation, and the demonstration of resilience in pursuing one's goals.

To address these challenges, in the next section, participants highlight their collaboratively designed recommendations for tech employers and training providers that support the need for more inclusive hiring practices, targeted wrap-around supports for learning and career development, and more opportunities for upskilling and career advancement.

Part 2: Reaching Success in Tech:

Co-Designed Recommendations

Perspectives of What is Needed for Success in the Technology Industry

As we seek to understand the factors that contribute to the successful navigation of tech learning and career pathways, it is important to acknowledge that the perception of what success looks and feels like is variable, as are the contributing factors for perceptions of success. The following section foregrounds how our participant workers and learners perceive success in the tech industry, as well as what they believe is needed for them to achieve this success. First understanding how participants perceive success allows us to then understand their following wishlist for career pathway supports that will help with achieving that success in the tech industry.

<table>
<tr><th>Perception of Success in Tech</th><th colspan="2">Perceived Contributing Factors and Required Skills for Success</th></tr>
<tr>
<td rowspan="2">Jobs with opportunities for:
- Access to great benefits
- Advancement
- Becoming a subject matter expert
- Building and maintaining professional networks for career advancement
- Doing more outside of work/ having more lifestyle options
- Flexible schedule for traveling and working remotely
- Inclusion
- In-house upskilling
- Livable income/financial stability/wealth investment
- Making a positive impact/ being a voice for others
- Positive mental and physical health
- Satisfaction/enjoyment/ happiness/ hope
- Working in a healthy work culture (utilizing talents/gifts, boundaries being respected, etc.)</td>
<td>Mindset
- Ambition/willpower/drive
- Confidence
- Dedication/commitment to learning more tech knowledge, industry trends, company/competitor information
- Discipline
- Empathy
- Flexibility
- Give everything my all
- Hard work
- Innovative
- Observant
- Open-mindedness
- Passion
- Patience
- Persistence
- Self-awareness</td>
<td rowspan="2">Technical Skills
- Analytic skills
- Computer and mathematical skills
- Continued upskilling/base-level training and certifications in tech
- Computer languages (e.g., HTML, CSS, Java, C+, CompTIA, SQL, Python)
- Creating ideas at work
- Data entry, coding, and organization
- Knowing how to research/use context clues
- Reading algorithms
- Systems knowledge (e.g., Tableau, Power BI)
- Technical knowledge to demonstrate how something works

Soft Skills
- Being able to be led (team-oriented)
- Collaboration
- Communication, active listening, and people operation skills (e.g., working with different personalities)
- Knowing how to be corporate appropriate
- Knowing how to make skills/learning transferable
- Leadership
- Learning how to find an answer
- Multi-tasking
- Negotiation of compensation
- Networking with higher roles/right people/people who can help you
- Time management</td>
</tr>
<tr>
<td>External
- A degree and certificates in the tech industry
- Money
- Reading different books
- Recruiter optimized resume
- Tuition-free /no more student loans</td>
</tr>
</table>

" I thought I had to know Steve Jobs. I also thought I had to have a full blown college education. I was thinking that you'd be starting off as a venture capitalist. That's what I thought tech was, a venture capitalist. It looks like such a lavish life that it's so unattainable, but it's not, and I love that."

– Participant 014

"You need the ability to be comfortable with asking people who know more than you information. I know sometimes that's hard when you don't know anybody or you don't know somebody from a can of paint. And it's hard to reach out and be like, "Can you explain this to me?" But if you get comfortable with that, you will go a long way. Because honestly, I've met so many people that want to help me get to where I want to be. So if you're uncomfortable with connecting with people or talking to strangers, just be honest. You don't have to fake it till you make it. You can say, "Hey, I'm here. I've done this. I know that's different than what I'm trying to do but this is where I would like to go."

– Participant 005

Tech Career Pathway Supports Wishlist

The following sections highlight themes of responses that emphasize inclusive supports that interview, survey, and design session participants identified as needed across various career pathway aspects (including 1) awareness and exploration, 2) education and training, 3) recruitment and hiring, 4) career entry, advancement, and retention). We segment out participants' designed recommendations of career pathway supports by categorizing action steps by response themes and by technology industry contributors (i.e., employers and education/ training providers).

What Can Education/Training Providers Do More?

1. Increase Awareness and Exploration of Tech Pathways and Resources

Marketing

- Create a centralized information hub where individuals can have a one-stop access to diverse tech platforms, tech organizations, programs, and global job opportunities.
- Show learners that there is more to the tech field than being a coder or software engineer. Bring awareness to other tech fields.

Collaborative Partnerships with Historically Black Colleges and Universities (HBCUs)

- Form strong relationships/partnerships with HBCUs to create a talent pipeline and make students aware of opportunities.

Target Younger Ages

- Have training programs that target Black youth.
- Advocate for tech classes (e.g., where students can learn SQL or Python) to be offered as an elective in all schools to increase interest, curiosity, and exploration of tech for all ages (some students don't want to or can't hang out for afterschool programs).

2. Improve Access to Educational and Training Opportunities

Access

- Increase access to technology education electives in all schools, especially in under-resourced communities, and focus on addressing disparities in training class placements, which could help increase individuals' familiarity with technology terms.
- Bring attention to free online services, courses, training programs, and software that employers have for employees when they get hired.

Build Social Capital

- Talk about social capital and the benefits of being proactive before learners finish the education/training program(s) (e.g., have learners work on networking).

Collaborative Partnerships with Employers

- Create partnerships that combine programs and apprenticeships to help bridge gaps between program completion and tech career entry to guarantee job placement.
- Have alumni of programs join trainees to do apprenticeships or internships.

Marketing

- Increase the promotion of affordable options, such as through the use of social media, to help encourage youth engagement and access to certifications and internship opportunities.

Resources

- Provide scholarships, financial support, and other wrap-around services (e.g., resources that help individuals achieve food security and improved nutrition) to ensure that learners make it through the program(s).
- Provide guidance to find a good position.
- Provide informative tools such as Blue book.

3. Implement Equitable Recruitment and Hiring Strategies

Increase Access

- Take technology teaching to remote areas; inform community leaders about tech career opportunities.
- Develop more opportunities for free training and multicultural training.
- Provide a platform, resources, and working material that will support culturally competent training.

Internship Opportunities

- Provide multiple internship experiences back-to-back at different places to give learners a feel of what most companies are looking for/what they expect of them.

Resume Skill Building

- Help with optimizing resumes for AI screening.

4. Intentionally Facilitate Career Entry, Advancement, and Retention

Ongoing Professional Development

- Provide more free or low-cost, flexible, and ongoing skills training and materials (this would allow individuals to keep up with rapidly changing technology and stay current in their field).
- Provide continued professional development (e.g., opportunities for individuals to build technical skills, soft-skills, communication skills, and promotion advocacy skills).
- Prioritize diversity and inclusion training.
- Provide opportunities for individuals to participate in formal learning programs, advanced technology workshops, seminars, conferences, certifications, and on-the-job training to keep up with the ever-changing tech industry landscape.

Networking Opportunities

- Provide connections to individuals in the nonprofit sector through access to tech nonprofit conferences
- Create mentorship programs that allow diverse mentors/program teachers to provide guidance, support, and networking opportunities to help individuals advance in their careers.

Resources

- Advocate for improved internet connectivity, availability of advanced technology, and constant power supply.
- Provide financial aid/support.

Employer Connections

- Widen options for learners obtaining internships and apprenticeships. Obtain and maintain contracts/ agreements with various tech companies (there's only so many slots available for the amount of people graduating).
- Increase communication between schools, training programs, and employers.

What Can Employers Do More?

1. Increase Awareness and Exploration of Tech Pathways and Resources

Marketing

- Create a centralized information hub where individuals can have a one-stop access to diverse tech platforms, tech organizations, programs, and global job opportunities.
- Generate awareness early (rather than focusing on just adults).
- Improve marketing for entry-level positions (e.g., increase tech information sessions for high school students and adults, and have guest speakers from various tech companies highlight their experiences).

2. Improve Access to Educational and Training Opportunities

Collaborative Partnerships with Training Programs

- Create partnerships that combine programs and apprenticeships to help bridge gaps between program completion and tech career entry to guarantee job placement.
- Show exactly where talent shortages are occurring, what technical/soft skills instructors need to be teaching, and what the day-to-day looks like for tech roles training providers are trying to prepare jobseekers for.
- Have alumni of companies join trainees to do apprenticeships or internships.
- Provide more career development experiences where individuals can gain more knowledge and get to do hands-on work with actual projects that the company is working on.
- Provide on-the-job training that equals having experience (e.g., longer and high-quality internships, apprenticeships).

3. Implement Equitable Recruitment and Hiring Strategies

Access to Information

- Provide learners and jobseekers with access to recruiters and technology industry insights (e.g., through an employment information platform).

Equity and Transparency

- Create inclusive job descriptions.
- Increase the amount of and criteria clarity for internships and apprenticeships.
- Utilize a more equitable Applicant Tracking System.
- Align hiring rubrics, screening questions, and tests with the skills needed in a specific position.
- Increase transparency in interview rounds and when presenting salary ranges.
- Advocate for and implement diversity initiatives aimed at increasing the representation of Black individuals in the tech workforce.

Experience Recognition

- Have entry-level job opportunities without years of experience requirements.
- Recognize micro-credentials/certifications.

Marketing

- Utilize social media platforms, such as Twitter, to increase reach to jobseekers.
- Demonstrate more stories/journeys of successful tech individuals, with special emphasis on what challenges they have faced and how.
- Emphasize that "soft skills" (e.g., building relationships, good writing skills, understanding customer needs, and clear/accountable communication) are just as important or more-so than technical skills.
- Provide more opportunities/newsletter/social media advertisements about job openings (because the jobs go fast).

Representation and Recruitment Practices

- Utilize targeted recruitment efforts, such as recruiting from HBCUs and minority-serving institutions.
- Implement nondiscriminatory and fair recruitment and hiring practices (e.g., decrease nepotism).
- Increase visibility and tech representation at job fairs and campus career fairs.
- Host informational sessions and speak directly in classes.
- Develop diverse hiring teams, which can help to 1) identify and amplify talented Black candidates and 2) reduce bias in the hiring process.
- Increase support for Black tech founders.
- Give jobseekers the opportunity to volunteer with the tech organization until a position is open.

4. Intentionally Facilitate Career Entry, Advancement, and Retention

Continued education/professional development

- Create a learning culture: Provide stipends for continuous upskilling, professional development, and relevant learning opportunities and certification access to help learners and workers keep up with trends in the tech industry.
- Increase job security strategies (and safeguards, such as in the event of tech layoffs, providing six months' pay as a cushion to find another job).
- Continue partnerships with education/training providers to offer upskilling opportunities.

Resources

- Provide more benefits (e.g., higher salary/at least equivalent to a livable income, more PTO and "work from anywhere" policies, stipends for physical and mental health, more time to attend education/ training programs, etc.).
- Pay for tuition programs in advance, rather than through reimbursement.
- Provide resources for social and economic development (e.g., collaborate with non-governmental organization agency support programs).
- Create availability needs and provisions of more technology resources.

Inclusive work culture

- Create a welcoming, inclusive, trusting, and multicultural environment that supports and values diversity and inclusion, and one that fosters safe spaces for advocacy and a sense of belonging for all employees.
- Believe in and encourage Black workers' identity and participation.
- Provide flexible working arrangements and transparent promotion/career paths.
- Ensure that compensation equity is accurate throughout the industry.
- Deliver continuous performance management. Support employee growth through collaborative/ open-minded teams and leadership.
- Consider where the employees are coming from (e.g., socioeconomic status, student status, what they bring to the table, etc.). Optimize/ lift up people on the team who have gifts/ different talents, which will elevate the entire team.
- Support work-life balance/flexibility (e.g., allow employees to take care of appointments, allow remote options to cut down on extensive commute times, etc.).
- Encourage collaboration between diverse individuals in tech (it's more than just white and brown men who know how to work in tech).
- Diversify higher positions in tech.
- Provide support groups for various identities.
- Implement policies and training related to diversity, equity, and inclusion (e.g., training on unconscious biases, microaggressions, and best practices that 1) prohibit discrimination based on race, gender, sexual orientation, dis/ability, age, etc., and 2) support the creation and maintenance of an inclusive workplace).
- Be transparent and accountable about diversity goals and metrics.

Networking opportunities

- Establish formal mentorship programs where experienced professionals guide and support junior employees for career development.
- Increase access to employer networks, senior roles, referrals, conferences, and resources (e.g., webinars and seminars) so that workers can have more opportunities to connect and grow.

Access

- Outsource work to small towns, rather than just to different countries (The city may be too far for people to commute to have in-person training/ career programs. Give people a chance to see what they are made of).
- Understand and address the needs of individuals with dis/abilities.

Part 3: Insights From Non-Four-Year Degree Program Leaders in Tech

Challenges and Opportunities for Supportive Program Practices

In collaboration with non-four-year degree credentialing program leaders in the technology field (ranging from administrative executives and recruiters of IT organizations to technology partner liaisons and department of education technology curriculum developers), we gained insight into the challenges, opportunities, and supports that impact their learners' navigation of technology industry related career pathways.

Below, we first bring awareness to the challenges program leaders may face while raising awareness of and recruiting within tech career pathways amongst Black learners and workers. Next, we identify program features, policies, and funding that help program leaders facilitate successful entry and/or advancement of learners and workers within the tech industry. Finally, we highlight action steps (informed by program leaders' experiences and responses to the Black learner and worker co-designed recommendations) that jobseekers, education/training providers, and employers can take now. By centering these participant experiences, these findings aim to:

1) build collective awareness amongst technology industry collaborators (including employers, educational/training providers, policymakers, and funders) of impactful support resources for successful tech career navigation; and
2) impact the recruitment, retention, and advancement of Black workers in tech fields through non-traditional educational and training pathways.

Top Challenges with Raising Awareness and Recruitment in Tech Career Pathways

- Tech industry exposure and networking opportunities
- Learner self efficacy, cultural identity, and feelings of belonging
- Access to learning, career, and support resources
- Retention due to financial and/or geographical barriers
- Institutional barriers (e.g., educational policies)
- Guaranteeing job placement and/or advancement after program completion

Program leaders discussed how entering the tech space can be a daunting experience for some learners: While there are many starting points for individuals interested in entering tech, not knowing where to start or which path is the right one can impact the action of just getting started in tech. Our program participants came to a consensus that while many of their students may be interested in tech, many may lack **exposure to and knowledge of the tech industry** (e.g., students may not receive this exposure within the school systems they attend), or lack **opportunities for networking** with professionals, particularly those from underrepresented backgrounds. To offset these challenges, some programs work to 1) have their program alumni share their experiences in meaningful ways with community members and potential program students, 2) recruit instructors who look like the people they are trying to serve through the program, and 3) educate their learners about various tech roles as well as how these roles can lead to economic mobility access. Yet, some program leaders find that even

these recruitment solutions pose their own set of difficulties and can reveal gaps in their ability to find/reach target students and diverse instructors who are able to commit to their programs.

Ramifications of these barriers related to limited tech industry exposure and connection to diverse tech professionals were found to cascade to subsequent challenges with learners' **self efficacy** (e.g., not realizing they are all technologists, feeling like their expertise is limited and experiences don't apply, low confidence/high anxiety related to networking with tech professionals and not fully knowing tech jargon, etc.). Challenges with **feelings of belonging** within the tech learning and workforce ecosystem also occurred (e.g., students with varied **cultural identities** feeling like they don't belong, or "othered", in STEM due to not fitting the stereotypes associated with tech professionals, or students struggling to persevere through imposter syndrome and doubting their abilities, etc.).

Opportunity

To increase tech industry exposure and networking opportunities with Black tech professionals, one program leader mentioned that they **raise funds to sponsor students** to attend their first tech conference, specifically BITcon. Others mentioned that they **ensure diversity in program and training instructors** and **host volunteer events with industry professionals of various backgrounds** (bringing hands-on tech items) to expose students to aspects of the industry they potentially don't know exist. Having students see diverse representation, connect with Black tech professionals, and showcase the skills that they're learning within spaces such as BITcon can help to increase students' sense of belonging and self-efficacy within tech.

To be able to fully access and participate in learning and/or career opportunities, meeting basic needs is essential. While many programs may offer free and extensive **learning and career services** (e.g., career counseling, mock interviews, and resume workshops), program leaders expressed that they may experience challenges with getting students to effectively **access these services** and/or challenges with student **retention** within the programs based on students' higher priority needs, such as needing access to:

1. Reliable transportation to educational/ training programs and networking events (e.g., commuting from rural communities)
2. Technology (e.g., computers) and reliable internet (which are needed to attend some trainings and/or to complete assignments)
3. Mental health resources
4. Time for earning income and/or taking care of family obligations (some training programs conflict with learners' work/ family schedules)
5. Basic necessities like food, shelter, and financial resources to pay essential bills

Due to these realities, program leaders often find many learners focused on the *now* with maintaining survival jobs rather than shifting their mindset and commitment toward preparing for future thriving jobs. This especially can be the case for training programs and certification exams associated with high costs. Thoughts of graduating from programs with debt while simultaneously looking for employment can also be found to contribute to students' deterrence from pursuing avenues that can lead to tech careers and/or accessing essential resources needed to succeed in the industry. Addressing these **financial barriers** is crucial to ensuring equitable access to tech training programs and opportunities for all aspiring professionals.

Program leaders also discussed how **institutional policies** can serve as barriers to learners accessing tech training programs. For instance, resistance to integrating industry certification exams into college courses can limit students' opportunities to gain relevant credentials. Additionally, there's a lack of intentional support for diverse students in workforce development programs, which further exacerbates disparities in tech education. As the tech industry is constantly changing and the need grows for learners and workers to continuously upskill to maintain relevance within the industry, addressing these policy barriers is essential to create more inclusive and accessible pathways for students interested in pursuing and persisting within tech careers.

Finally, program leaders commonly expressed that learners want to know that there is a **guaranteed job** at the end of committing time and energy to a credentialing program. Some leaders mentioned how they used to be in a position where they could offer more job placements through their relationships with various organizations. However, with the number of individuals the programs now serve coupled with the current tech industry hiring environment, it is not as easy to guarantee all of their learners a job placement right at the end of program participation. Other program leaders mentioned how they've identified blind spots regarding ongoing support of students once they are employed. One participant mentioned that while they do conduct 30-, 60-, and 90-day check-ins once students are employed and match students with industry mentors, there is still a need to devise additional strategies to ensure students' **long-term success and advancement** within the tech industry.

Opportunities for Raising Awareness and Recruitment in Tech Career Pathways

Recognizing and acknowledging the aforementioned challenges enables practitioners to then identify areas of opportunities for supporting the entry and advancement of underrepresented populations to the tech industry. In the following section, we highlight program features (developed from identified best practices in upskilling as well as research on cross-class connections leading to economic mobility), along with examples of supportive policies and funding that help program leaders facilitate successful entry and/or advancement of learners and workers within the tech industry.

Impactful Non-Four-Year Degree Credentialing Program Features

Recruitment/Outreach

- Advertising on various platforms, such as Twitch and YouTube.
- Recruiting through word-of-mouth, letting people know that employers can pay for employees to get additional training, and showing that learners don't need a four-year degree to get into a technical career/make a higher wage (it's all hands-on experience).
- Connecting with community colleges.

Career Services

- Career development: one-on-one advising, career planning, career goals setting, and six months of post-cohort support.
- Teaching learners to utilize the hidden job market (e.g., not just going to job boards) where they can find tech roles through networking (e.g., utilizing LinkedIn connections) and job searching by skills learned rather than course titles.

- Job search portfolio creation: Mock interviews, resume and cover letter workshops, LinkedIn, Interview prep materials (e.g., STAR (individuals who are skilled through alternative routes) stories).
- Having HR partners talk to learners about how to interview or what to say on their resume so that they can be prepared for next steps.

Resources Through Partnerships

- Skill Connect by Indeed. One year of LinkedIn premium.
- Free therapy sessions offered throughout the duration of the program.
- Post program, learners having access to deeply discounted therapy session costs (e.g., $5 -$10 per session).
- Financial aid (e.g., child support payment help, food, transportation coverage, program tuition coverage, certification cost coverage, subsidized bootcamps, not requiring students to pay money upfront).
- Working with CareerSource organizations and workforce development agencies to recruit individuals of diverse backgrounds to IT.
- Once students obtain an industry certification through their program, it is then articulated as credit through partner colleges.

Networking and Tech Industry Exposure Opportunities

- Ongoing volunteer events/opportunity chats where industry professionals come to network with program students.
- Having demo days where students are able to showcase to industry partners what they've done through the program duration (e.g., cybersecurity, cloud computing, software development, etc.).
- Weekly tech talks/lunch.
- NearPeer learners/fellows: Partnering students with other fellows for support.
- Diverse representation of instructors.

Upskilling Opportunities

- Program/courses with clear start and end goals (roadmap of how to get to the end goal/career in tech).
- Assistance with obtaining industry certifications at low or no cost.
- Preparing students for how to pass industry certification tests.
- Offering programs that don't require specialty computers to increase technology accessibility (e.g., having everything be web-based).
- Offering classes that teach basic computer skills.
- Programs with obtainable time commitments (remembering these are adults who have prior commitments such as jobs and families).
- Offering C-suite level courses with the intention of helping employers understand what everyone does in the organization and where they may need more tech skills.

Post-program Support

- Mentorships/mentor match-ups with industry professionals.
- Assisting students with getting employment within 90 days.
- 30-, 60-, 90-day check-ins once program participant is employed.
- Offering financial team assistance for paying back what may be owed from trainings.

Supportive Funding	Supportive Policies
• **Community** foundation grants • **Philanthropic** organization grants • **Earned revenue** from employers, sponsorships, and learners • **Economic development and regional development** authorities • **Government grants** • **Internal funding** • **Regional Economic Development Corporation** • **State funding** and **city funding** for talent attraction and retention ▪ (e.g., READI grant, which is designed to foster local community and regional collaboration to attract, train, and retain local talent)	**State mandates for (CS) education** • (e.g., Computer science state education plan) **Government grant and professional organization policies** that specifically support efforts with • **historically marginalized or at-risk groups** (e.g., veterans, unhoused individuals, justice-impacted individuals, individuals with dis/abilities, etc.) • **diversifying specific industries** (e.g., NSF grants for computer science) **State initiatives** (e.g., Next Level Jobs Workforce Ready Grant) that help jobseekers explore careers and get career advice while simultaneously helping employers find talent to fill positions **Collaborative partnerships** between training programs, and local community colleges, and employers

> *"Our executive director wrote legislation that requires computer science to be a high school graduation requirement in the state, which directly impacts our organization. But even more broadly, it impacts our Black students, ensuring that they know that you have to have this class to graduate. But due to that, states are in the works of ensuring that every household in the state has viable internet because of this requirement."*
>
> - Program Leader A

Technology Industry Trends and the Advancement of Black Talent

As important as it is to identify strategies that facilitate the recruitment and entry of Black learners and workers into the technology industry, it is just as critical to focus on the advancement of Black talent within the technology learning and workforce ecosystem. Recognizing that the tech industry continuously evolves with emerging technologies and practices, we asked our program leader participants to identify current technology industry trends and how they are working to prepare their learners to stay relevant and ready for the changing needs of the industry.

Current Technology Industry Trends Impacting Learners and Workers

Hiring

- Large tech companies are not doing as much hiring because they are doing massive layoffs. It is mainly **smaller to medium-sized companies** (500 and under) that are currently hiring in bulk and retaining those people.
- **Skills-based hiring:** There is a shift where many companies are **no longer requiring a four-year degree**. They are **looking for people with certifications** that meet the PAR level. Skills-based hiring helps to level the playing field for jobseekers and helps employers know the quality of candidates they are interviewing
    - However, there are still some systems and structures that support individuals who go the traditional route (e.g., The degree requirements may be taken off of job listings, but hiring managers may still have biases of looking for degrees rather than solely the skills), or they are requiring three to five years of experience if utilizing skills-based hiring.
- Employers are looking for skill sets (e.g., critical thinking, problem solving, etc.) rather than just proficiency in a specific skill. Some job descriptions created may be a mismatch of what tech skills employers are actually looking for.

Artificial Intelligence (AI)

- There is a rush and urgency around **mastering AI tools**. Companies are seeing how to **automate processes** that may have never really been automated.
    - e.g., building trades are going into AI, where instead of writing up blueprints they are now doing augmented reality (AR) or virtual reality (VR) of what a project is going to look like.
- People are getting fewer person-to-person experiences and more person-to-machine experiences. **Machine learning** is really important: AI is only as smart as the information that is put into it.
- **The following are helpful skills to learn:** Copilot and integrating Copilot into Excel, PowerPoint, etc., AI capabilities and limitations, AI prompt engineering (which doesn't require a degree).

Other Evolving/Emerging Tech

- **Robots** (e.g., automation, manufacturing, software development, cybersecurity)
- **Drones** (e.g., utilized in entertainment, sports, real estate, recreation, electricity)
- **Sensors** (e.g., sensor connectivity such as in smart homes)

Cybersecurity

- Companies continuously get hacked. There is a need to learn not only how to **formulate and use data ethically,** but how to **secure data** as well.

In identifying these tech industry trends, participants acknowledged how some of these trends can directly impact the entry and advancement of Black workers and learners into tech. For instance, some program participants expressed that AI is both an opportunity and challenge: While much of their programming involves doing entry-level tech, some are noticing how tech organizations are highly processing how to utilize AI to limit the use and need of some entry-level jobs. Others expressed that some major tech companies are offshoring entry-level roles rather than hiring U.S. talent to take care of those needs. In terms of skills-based hiring, a challenge that surfaced included how employers are changing the language of what is required, yet maintaining the same barrier for entry and advancement of learners and workers of color.

> *"What we've discovered is without the degree, because of our skin color, the industry certification alone does not cut it. It might be okay for a little while, but the minute layoffs come, we're susceptible…The person with the least amount of work experience gets laid off. For people of color, Black people, you still need a degree. Once you get your job, go back to school. I feel like once they go through our program, then being able to successfully complete the degree, the percentage goes way up. I encourage a lot of my students: 'Just go back and finish your degree. You have the skills, you know what you're doing now. Just go in.'"*
>
> - Program Leader B

While these challenges were highlighted, program leaders discussed that to overcome these entry and advancement barriers, they are taking action steps, such as teaching their learners how to use AI in a way that makes them experts on what companies want, advocating for sponsorship of workers at the C-suite or higher level (e.g., where decision makers can essentially force changes to occur), encouraging mentorship and resource sharing from tech industry boardroom members and tech professionals from all backgrounds so that learners can gain new and differing perspectives, and facilitating the continued education and upskilling of learners and workers.

> *"If we don't get Black students and technologists in the building writing this code, there's going to be some detrimental consequences that we will face. And I mean, we're seeing it already (e.g., AI has started replicating the system that already exists with the haves and the have nots). Here's the secret. None of the organizations know how to use it (AI) right yet either. They're all trying to figure it out. And so we're trying to figure out how to leverage that in a way that helps us to really highlight our learners still."*
>
> - Program Leader C

Summarized below are additional action steps (informed by program leaders' experiences and responses to the Black learner and worker co-designed recommendations), that jobseekers, education/training providers, and employers can take now to impact the rates in which Black workers and learners enter, advance, and persist within the tech industry through various pathways.

What Can Employers Do Now?

Provide Networking and Mentorship Opportunities

- Give employees opportunities to continuously network and maintain these connections (through virtual and in-person experiences).
- Foster connections via on-the-job relationships, such as formal and informal mentorship between new talent and individuals who have been in the organization/tech industry for a while. This can help newer employees feel a sense of belonging, safe, and comfortable with asking questions.

Provide Ongoing Professional Development/Upskilling Opportunities

- Learn more about certifications and get your employees ready so they can maintain their roles or get higher paying roles.
- Partner with and utilize training programs as a resource.
    - Get employees/HR to take a course to gain a high-level overview of different industries that could potentially be in the tech field (and to know what is needed within the tech industry in order to recruit and upskill employees).
    - Create comprehensive road maps to identify specific programs, resources, certifications, etc., (as well as the associated cost and accessibility of these opportunities) that can get learners to specific roles and careers.
- Create internships and apprenticeships to help get people in the door and then process and understand that they belong in the room.

Increase Reach and Recruitment Intentionality

- Get involved in your communities, such as getting into schools, community colleges, etc. to let students of all backgrounds know pathways to tech and to help change the perception of what tech actually is (e.g., connecting technical skills to everyday practices, such as utilizing phone apps, designing TikToks and video games, synthesizing music, and athletic statistics, etc.).
- Be more clear and intentional about what your organizations really want/need, as well as how these needs are matched to job seeker skill sets through applicant tracking systems and interview processes. There is often a gap in what employers may expect for people to do and what people are actually trained to do.
- Reach learners and new workers by communicating where they are (e.g., Discord, Slack, anything text-based versus jargon filled emails) to encourage them to speak up.

Increase Cultural Competency Efforts and Measures

- Develop, implement, and enforce policies, procedures, expectations, and leadership staff to be culturally competent (e.g., become aware of their blind spots and biases, do more than list DEI initiatives and trainings on paper, etc.) to ensure safe and transformational spaces for all identities.
- Invite and provide space for employee feedback to be acknowledged, addressed, and adjusted for (e.g., this can take place via check-ins, one-on-one meetings, surveys, etc.).
- Ensure diversity, equity, and inclusion in all employer practices (e.g., don't just call on one specific person to represent an entire culture or identity; recruit different identities and perspectives in the room).
- Learn from different perspectives and understand what is truly needed by serving the community and putting community needs before your own.

What Can Education/Training Providers Do Now?

Partner with Tech Employers

- Create comprehensive roadmaps to identify specific programs, resources, certifications, etc., (as well as the associated cost and accessibility of these opportunities) that can get learners to specific roles and careers.
- Provide opportunities for continuing education or professional development (e.g., apprenticeships, experiences involving problem solving real world projects, developing portfolios to showcase skillsets and created projects/ products, etc.) in the entry-level roles to get workers and learners to the next level.
- Give learners opportunities to continuously network and maintain these connections (through virtual and in-person experiences). Assign learners with mentors who are within the tech field.
- Connect learners directly to employers with job opportunities. If learners don't find jobs within those first four months of graduating from programs, it becomes really difficult to secure employment.

Stay on Top of Industry Trends

- Know what government administration platforms are (e.g., the latest administration was cybersecurity and apprenticeships) and get your learners ready so they can maintain their roles and/or get higher paying roles.

What Can Jobseekers Do Now?

Learn About the Tech Industry

- Don’t be afraid to research information about the tech industry. Learn as much as you can and from credible sources to stay up-to-date on industry trends.
- Understand what part of the tech industry you want to go in and where the best starting point is for you.

Start and Continue Upskilling

- Utilize free resources such as Coursera, Udemy, and Codecademy. Love and keep track of lifelong learning on your resume.
- Build individual capacity to help prepare for engaging with tech industry employers and professionals. For instance, look into resources such as for therapy (e.g., to unlock levels of self-knowledge).
- Listen to podcasts (e.g., CodeNewbie) to learn about other individuals’ tech journey stories.
- Continue honing your skills and credentials to stay relevant within an evolving industry.

Network

- Follow tech people on LinkedIn and Instagram to stay abreast of things that are up and coming.
- Never shy away from meeting and making a connection with somebody new in the tech industry (this is how many people get their next good gig).
- Seek out mentorship from people in tech who can help set you up to be successful.

Implications

Where Do We Go From Here?

Through listening to the lived experiences of Black workers and learners as well as non-four-year degree training program leaders, we've identified learning and career pathway challenges and opportunities that may facilitate or constrain learners' and workers' entry into the technology industry. While there may be many tech-centered training programs and educational tools available to the public, gaps in raising awareness of them and generating complete access to these opportunities can continue to leave those who need these services most at the margins of the tech educational and workforce ecosystem. The persistence of Black workers and learners in technology career pathways depends on more than having educational and training programs, tools, and resources in existence. There is a need for technology industry contributors to further attend to, continuously advocate for, and build capacity to support additional facilitating factors such as:

1. Policies that make computer science classes a requirement for K-12 students, leading to required infrastructure changes to support technological and instructional access. This can ultimately help generate increased interest and exploration of the tech industry among historically and systematically excluded populations;
2. Diversity, equity, and inclusion procedures that build and enforce culturally competent practices and spaces that support all identities within the tech educational and workforce ecosystem; and
3. Collaborative partnerships and networking between employers, education/ training providers, tech industry leaders, and community organizations, with workers and learners at the center. This will help generate intentionally targeted, holistic, and accessible career pathway supports, as well as a more streamlined connection between training program completion, job placement, and career advancement.

Actively pursuing opportunities to ensure that steps such as these are taken will not only increase inclusive and accessible tech career and economic mobility opportunities for Black workers and learners, but this will also help to make a more representative and culturally competent tech industry that can better support the needs of an ever-evolving and diverse society.

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