



Digital Skills for the 21st-Century Workforce

2019 Federal Reserve System

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Improving Outcomes for Workers and Employers

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2019 Special Topic Brief

Topic Overview

The changing nature of work necessitates the development of digital skills in the knowledge economy. Within the rapidly expanding health care, tech, manufacturing, and finance industries, middle-skills jobs increasingly require workers to cultivate a robust digital skill set to compete in an economic market marked by technological innovation. Research from Burning Glass Technologies has shown that nearly 8 out of 10 middle-skills jobs now require a degree of digital proficiency. At the same time, employers report a digital skills gap that hampers economic productivity and growth in their respective sectors.

To propel America's workforce forward, a proactive approach to workforce development must address the changing technological demands of employers within talent pipelines. Furthermore, supplemental training for midcareer professionals is necessary to upskill workers as automation transforms job tasks. When workers are equipped with digital skills and a proactive workforce development strategy, they are more prepared for digital disruption and career pathways into middle- and high-skill jobs, fostering economic mobility. Understanding the shifting need for digital skills in the 21st century is vital to regional economic growth and competitive human capital development.

This brief will examine perspectives from both roundtable listening sessions held during the summer of 2018 and research in the workforce development field to explore what challenges and innovative strategies have been used to prepare workers with digital skills for 21st-century jobs.¹

Opportunities for digital skills investments include:

- Apprenticeship and other work/learn/earn programs
- Credentials and skills-based hiring
- Upskilling and reskilling for incumbent workers
- New funding models to pilot and scale programs
- Tech training partnerships

Digital Skills for the 21st Century

Background on Digital Skills

The demand for digital skills in the job market increasingly requires that workers bring technological know-how to the table, especially as innovation and automation change the nature of work. According to *The Digital Edge: Middle-Skill Workers and Careers*, a report from Capital One and Burning Glass Technologies, 82 percent of middle-skill jobs have become digitally intensive, with digital skills listed as concrete requirements.² While the number of new jobs requiring digital proficiency is significantly increasing, many workers are left without a foundational skill set to compete for the fastest-growing jobs. Research from the Federal Reserve Bank of Philadelphia indicates that digital automation of tasks can adversely affect the job prospects of low-skill and less advantaged workers, which amplifies income inequality.³ In addition to digital automation, a lack of access to training programs that prepare workers with relevant experience can be a contributing factor to the skills gap, and therefore an impediment to economic growth. This trend displaces incumbent workers with aging skill sets, challenges young and future workers who are entering into rapidly changing jobs markets, and limits the economic productivity of businesses.

The Rapidly Changing Market for Digital Skills

In several roundtable listening sessions held during the summer of 2018, a cross-sector group of representatives from the health care, tech, manufacturing, and finance industries provided insight on challenges in workforce development as they pertain to digital skills and the pace of technological innovation. Throughout the discussion, the sheer pace of innovation was highlighted as the foremost issue for all participants. Workers are challenged to upskill as additional competencies are required, while employers struggle to provide supplemental digital skills training to retool their workforces. A report from Brookings Institution confirms this observation from industry stakeholders. The authors of the report found that employment in high digital knowledge occupations—such as financial managers, computer systems analysts, and software developers—more than tripled, while employment in occupations with medium digitization also increased between 2002 and 2016.⁴ However, employment in low digital knowledge occupations decreased during the same period. Roundtable participants indicated that there were specific tasks that have begun to change quicker than others, which include human capital management, information technology (IT) security, decision modeling, and data management analysis.

Several topics surfaced as predominant concerns for occupations with rapidly evolving tasks. First, they require a level of digital literacy and sector-specific business acumen to execute the job effectively, which introduces a significant barrier to entry for midcareer professionals. Business productivity is as dependent on a workers' sector-specific, contextualized knowledge around a technology as it is on their conceptual understanding of the technology they will be using. Second, while repetitive tasks in various occupations areas are increasingly automated, workers will need to develop learning agility to maintain a relevant, dynamic skill set. However, developing a durable skill set does not necessarily mean overemphasizing tools like coding, as these skills often change quickly, but rather understanding how innovative technologies can be implemented within a company. Although newer workers entering the market directly from an educational program may have a more applicable skill set than their experienced counterparts, they are expected to engage in continual learning, as the relevancy of their skill set quickly erodes due to task automation.

Financial Limitations in Digital Skill Building

Additional topics of concern discussed in the listening sessions included the financial limitations of workforce development for digital proficiencies. Employers commented on the scarcity of financial resources as a barrier for training providers and workers from meeting industry demand for skills. The discussion around these financial challenges emphasized access to capital and creative financing for cost-burdened workers seeking to upskill, the constraints placed on public sector training providers by various funding regulations, and the opportunity costs associated with reskilling employees that firms seek to offset. If businesses have the capacity to confront each of these challenges, it can greatly alleviate the economic burden that tech innovation creates for key stakeholders. Moreover, alternative training programs outside the traditional four-year postsecondary model, such as coding boot camps and IT apprenticeships, were broadly supported as viable options. One participant noted, "If we could think about the needs of the next generation of our economy, could we develop alternative models that get us to be really competitive?"

Stakeholders in each listening session built on the idea of innovative, flexible funding and job training models as necessary improvements, with the purpose of quickly adapting workers to the changing nature of work. However, the perceived risk around alternative talent pipelines presents an obstacle for employers who are not yet ready to shift their hiring practices. One training provider noted, “Individuals have now become responsible for their own education and training, where before employers were partners in that.” The need for additional champion employers who embrace alternative talent pipelines is necessary to shift ineffective workforce development strategies. Champion employers incorporate innovative hiring, upskilling, and retention practices into their business models, such as data-driven career pathway models, while leading workforce development conversations toward unexplored solutions.⁵ Furthermore, fostering a clear dialogue between training providers, who have an intimate knowledge of emerging certifications, and hiring representatives will help alleviate the perceived risk around lesser known credentials.

The lack of flexible funding from the public sector means that many nontraditional work programs do not receive adequate financial support. For example, an individual who wishes to enroll in a coding boot camp could not use Pell Grant funding to pay for the program based on regulatory restrictions. Currently, Pell Grant funding is available only to programs that run at least two-thirds of an academic year, or 600 hours, despite a policy movement to expand eligibility requirements for short-term programs and credentials.⁶ Similar funding constraints are particularly concerning for low- and moderate-income workers, who are often faced with a significant opportunity cost in addition to tuition and fees. For example, these workers are likely to weigh the future benefit of a technical training program against forgone wages in an upcoming paycheck. Innovative programs must capture new forms of partnership to invest in digital skills.

Opportunities to Invest in Digital Skills

Technological innovation often moves at a faster pace than the systems that prepare workers. Recent studies on the adoption of automation, artificial intelligence (AI), or other technology in the workplace indicate that this rapidly changing, technically inclined labor market requires a nimble, innovative approach to building skills. A recent Federal Reserve Bank of Philadelphia study on automation noted that “displaced workers need to consider other postsecondary options or improve their skills in order to switch occupational categories.”⁷

Listening session participants noted that opportunities to develop applicable digital skills require more than a single coding boot camp or training program. With the rapidly evolving landscape of technical skills, workers need to understand digital skills in context. The importance of contextualized technical training was a theme that appeared in multiple listening sessions, from both employers and training providers. A representative of a major employer from the health care industry noted, “You need both the hands-on tech kind of understanding coupled with the bigger-picture business understanding.” Digital platforms affect business models, and vice versa, which requires building an understanding of how they interact with each other. Once synergy between tech skills, businesses acumen, and other aspects of a business model is achieved, it improves an organization’s conception of how productivity is measured and its impacts on an employer’s overall goals, according to one business leader.

Beyond understanding technology in context, another theme listening session attendees stressed was the importance of continual learning. As a major technology training provider explained, “The half-life for digital skills is much shorter than it used to be.” With skills changing at a rapid pace, reskilling and upskilling become important throughout an individual's career. From new-customer relationship management platforms to nascent coding languages, education providers cannot predict what specific technical skills will be needed by the time young people graduate from college. A study by Pearson highlighted the importance of building transferable skills and critical thinking as both employers and educators invest in lifelong learning. Workers are more effective in their positions when they are trained with skills as well as contextualized knowledge, especially when the goal is lifelong learning in the workplace.⁸

Apprenticeship and Work-Learn-Earn Programs

Apprenticeships provide individuals entering the labor market the opportunity to learn while on the job and without forgoing income. As proven with apprenticeship programs in the technical trades, like manufacturing and construction, workers have the opportunity to learn under the tutelage of a professional in a given occupation. The on-the-job training helps workers understand the technology needed to be productive in the field, in addition to the contextual knowledge for applying the digital skill. Apprenticeship programs in nontraditional fields such as IT have increased in recent years. Other work-learn-earn programs provide a stipend to students who are participating in a six- to eight-month digital training program to offset the cost. One of the predominant barriers to developing a new skill or reskilling oneself can be the financial burden of enrolling in a training program. Apprenticeship and work-learn-earn programs effectively offset such challenges while bolstering workforce development efforts with cost-constrained individuals.

New Credentials

In a tight labor market, in which an economy has neared full employment and hiring workers is increasingly difficult, employers have raised concerns about the inability to recruit technical talent that meets their current workforce needs. A 2016 study conducted by Harvard Business School, *Dismissed by Degrees*, notes that an increasing number of job postings require four-year degrees as a means of assessing worker readiness and technical proficiency. However, using a four-year degree to signal digital competency has been a concern in the tech industry, as it impedes the diversification of tech talent pipelines. The movement toward removing degree requirements and reaching new audiences for technical training has the ability to open doors to talent that might not otherwise be represented in the industry.

New credentials, such as those from CompTIA and Amazon Web Services, have achieved some success in training workers without a degree through workforce development partnerships. Similar programs and certifications have provided some employers with an opportunity to shift hiring practices away from identifying qualified workers based on the presence or absence of a four-year degree on a résumé. Nevertheless, continual feedback from employers on the efficacy of emerging credentials is vital to ensure training programs maintain relevant curriculums and equip workers with needed skills.

Upskilling and Reskilling Incumbent Workers

Listening session attendees emphasized the importance of investments in upskilling and reskilling current workers while promoting continual learning. As the needs of the workforce evolve, continual learning is essential for maintaining business productivity and placing workers in career pathways. However, many workforce training providers expressed concerns that employers are not providing career pathway opportunities for incumbent workers. Some of the solutions highlighted during the roundtable discussions included employer programs that provide employees the opportunity to return to school while working, at the same time also facilitating an environment where workers can hone their skills on the job. Work-learn-earn models allow workers to have their educational costs financed by an employer and/or workforce training provider while receiving a stipend or wages during their program. After finishing a training program and finding a job with some career support, typically the worker agrees to pay back a portion of their income in return. The work-learn-earn model functions best when it opens opportunities for training with monetary support for underrepresented and underprivileged workers.

New Funding Models to Pilot and Scale

As outlined previously, one of the primary concerns from listening session attendees was the ability to pilot new training programs with limited funding sources. Furthermore, participants noted the inherent challenges of accessing public sector funding, which does not pivot or evolve as quickly as the needs of the private sector. While technical skills evolve, the public workforce system is limited in its ability to provide higher-level digital training.

Innovative funding models among key stakeholders can alleviate the financial constraints that often accompany piloting a training program. Specifically, the collaborative funding model pools capital from national and local philanthropic funders for a group of firms interested in achieving the same workforce development goals. The strength of the collaborative model is how it promotes a strategic approach to program implementation and the allocation of resources, while addressing the financial constraints among local stakeholders seeking a common goal. Collaboration to remove funding barriers builds the capacity of local workforce systems to address the current needs of the labor market and prepare for potential changes in the future.

TEKsystems and Per Scholas: Customized Tech Training Case Study

With growing demand for technical skills and a widening talent gap, companies are seeking partnerships that can provide a skilled and diverse talent pipeline to meet their demand. In response to this need, Per Scholas—a national tech training nonprofit—launched a social venture to develop tech training with curriculum tailored to employers' specific needs. Beginning in 2019, Per Scholas and TEKsystems—a leader in full-stack technology services, talent services, and real-world application—will partner to provide customized training to job seekers in Boston, Detroit, and Philadelphia. TEKsystems and Per Scholas piloted the initiative in Baltimore, where Per Scholas trained 18 individuals and TEKsystems hired 60 percent of the graduating class within a month of course completion. Skills-based training tracks will be determined from the demand in each local market and may include skills relevant to cybersecurity, software engineering, and data engineering, among others.

Tech Training Partnerships

Partnerships within industries and between training providers have been discussed in several best practice guides on workforce development, including those from the Aspen Institute,⁹ Greater Houston Workforce Development Workgroup,¹⁰ and the U.S. Agency for International Development.¹¹ However, in the face of a rapidly changing economy and an increasing demand for technical skills, new catalytic partnerships are coming together to address the talent pipeline for digital skills. These partnerships may take a variety of forms: collaborative industry models supported by local chambers of commerce, initiatives that establish leadership councils comprised of vested regional stakeholders, or efforts to streamline the way employers share job information around tech talent needs. With an explicit focus on digital skills, tech training partnerships serve the primary goal of tearing down siloes, promoting information sharing, and bolstering regional economic growth through collaboration.

Conclusions

The perspectives of listening session attendees and the current data on the rapidly changing economy make clear the economic imperative for investing in digital skills. From health care to social services to education and manufacturing, industries are quickly embracing new technology in their business models. While scholars disagree on the rate of automation and tech innovation, changes are nonetheless affecting job seekers in a more digitally intensive labor market. In order to use the skills needed in a 21st-century workforce effectively, job seekers must be able to apply critical analysis and be digitally savvy.

The opportunity models discussed here are certainly not a definitive list of innovations in digital skill building. That said, they do share some commonalities mentioned by listening session attendees. Each model creates more efficient, cross-sector feedback loops between training providers and employers, while shifting organizational focus toward advancing innovative workforce development solutions.

Workforce development is an integral aspect of economic development strategy and the need to invest in digital and technical skills is salient. Regions seeking to build a talent pipeline should consider all points of entry along that pipeline, from young and future workers to those who risk being displaced in the existing labor market. This effort entails a new mind-set around recognizing degrees, certifications, and credentials for technical talent, knowing that not all job seekers will have college degrees but may have the skills needed to learn, adapt, and advance along a career pathway. Incorporating workforce development models that account for digital disruption will provide expanded opportunities for individual economic growth and mobility and help to achieve a more resilient and vibrant economy.

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Methodology

In 2017, the community development departments at each of the 12 Federal Reserve Banks organized regional meetings at locations around the country with nearly 1,000 workforce development leaders to confer on the status of the nation's workforce development system and the challenges it faces. The community development team at the Federal Reserve Bank of Philadelphia gathered and analyzed the information from those meetings, and it subsequently published [Investing in America's Workforce: Report on Workforce Development Needs and Opportunities](#).

In 2018, the Federal Reserve's community development departments conducted a second series of regional meetings with stakeholders across public, private, and nonprofit sectors. The meetings focused on several workforce-related topics that impact communities, which originated from themes captured in the 2017 report. A series of special topic briefs were created based on regional meetings and community development research interests. Briefs include research and insights from workforce development organizations, experts, and community development staff.

About the Initiative

Investing in America's Workforce is a [Federal Reserve System](#) initiative in collaboration with the [John J. Heldrich Center for Workforce Development](#) at Rutgers University, the [Ray Marshall Center for the Study of Human Resources](#) at the University of Texas at Austin, and the [W.E. Upjohn Institute for Employment Research](#). Led by the community development function of the Federal Reserve System, the initiative aims to reframe and reimagine workforce development efforts as investments that can lead to scalable solutions and measurable outcomes. Components of the initiative to further this goal include:

- A series of listening sessions and [subsequent report and special topic briefs](#) aimed at gathering and analyzing information and ideas from people who work at the intersection of workforce training, recruiting, and finance.
- A [national conference](#) in Austin, Texas, in October 2017, where over 300 attendees discussed promising approaches to workforce development.
- A [three-volume book](#) that offers research, best practices, and resources on workforce development from a wide range of experts in various fields.
- A training curriculum for Community Reinvestment Act bank examiners on qualifying workforce investments under new Interagency Q&A clarifications for the regulation.

For more information about the initiative, and to read chapters from the three-volume book and other special topic briefs, please visit www.investinwork.org.

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