



# Foundational Digital Skills for Career Progress

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The digitization of work has changed the nature of the skills that jobs require.

The increasingly technological nature of jobs means that digital skills are necessary for workers to thrive in the modern workplace and will become even more important. Even occupations that have not traditionally required technology are increasingly demanding it. Much attention is paid to specialized digital skills such as programming and information technology (IT) work, but less specialized (or foundational) digital skills—the ability to use digital tools to complete tasks in various settings—are worthy of attention given their place in nearly all aspects of work. Research shows, however, that many workers and job seekers lack foundational digital skills. Closing this gap requires digital training, especially for adult learners and workers displaced from occupations. Training and education providers need to develop programs that teach job seekers and workers foundational digital literacy.

This brief synthesizes research on the rising demand for foundational digital skills and how many adults and out-of-school youth have these skills. We supplement this using interviews with organizations teaching digital skills to people who lack them. This work seeks to inform programs offering job training and employment assistance of the importance of foundational digital skills and that many people lack these skills. We hope this brief will lead to the adoption of foundational digital skills training and a better understanding of the strategies and challenges involved.

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## BOX 1

### The Urban Institute's Partnership with JPMorgan Chase

The Urban Institute is collaborating with JPMorgan Chase over five years to inform and assess JPMorgan Chase's philanthropic investments in key initiatives. One of these is New Skills at Work, a \$250 million multiyear workforce development initiative that aims to expand and replicate effective approaches for linking education and training efforts with the skills and competencies employers need. The goals of the collaboration include using data and evidence to inform JPMorgan Chase's philanthropic investments, assessing whether its programs are achieving desired outcomes, and informing the larger fields of policy, philanthropy, and practice. This brief and infographic summarize the state of the evidence on the need for digital skills, the gaps in digital skills that exist among workers, and how digital skills training is taking place in programs.

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## Defining Foundational Digital Skills

Digital skills are defined in different ways, reflecting a lack of common terminology in this area. The varying levels of digital skills has been discussed for well over a decade, pioneered in Hargittai's (2002) article "Second Level Digital Divide: Differences in People's Online Skills." This study focuses on *foundational digital skills*, nonspecialized digital skills that may be important for carrying out a job but are not the job's main substance. "Foundational" digital skills are in contrast to "specialized" digital skills required for jobs that are all or mostly digital, such as a computer programmer, developer, software engineer, or IT support person. We use "foundational" to mirror the concept of other foundational skills that are often needed for such work as basic communication, literacy, and numeracy skills (Shechtman et al. 2016). And although foundational digital skills can be used in many spheres of life, we focus on digital skills for work.

Foundational digital skills exist on a continuum from basic to advanced. On one end are basic skills of how to use information and communications technology, or "digital tools"—for example, being able to turn on a computer, use a mouse, or access the internet. The next level of skills involves using these tools to carry out specific digital tasks, such as writing an email, making a résumé, or searching for specific information on the internet. These tasks are often taught in a specific context—such as using a certain software or specific platform or application—and have clearly defined steps to accomplish the task. A higher level of foundational digital skills is being able to take the knowledge of how to accomplish specific digital tasks and applying it to new circumstances, contexts, or platforms. For example, a person can work with a database to retrieve information or look up his or her hours on a digital scheduling system. At the next level, a person could use his or her knowledge to retrieve information from different databases or use the scheduling system to set schedules for others. We refer to this as being "digitally literate," being able to combine base knowledge and problem solving to approach new platforms and uses.<sup>1</sup> As digital technology, platforms, and applications change, digital literacy means people can more easily learn new digital tasks.

Of course, there are degrees of digital literacy. Some people have a broader range of digital knowledge or more experience using their skills. But gaining foundational digital skills and reaching a level of digital literacy is important. It makes it easier for a person to transfer digital knowledge across jobs and potentially advance from entry-level jobs or make occupational changes. Digital literacy can be important even where employers provide training on specific digital tasks or systems, as they may assume some level of digital literacy to take advantage of that training.

A key point in the literature is that moving from knowledge of specific skills and tasks to broader digital literacy involves confidence, familiarity, and interest. Confidence likely affects a person's ability to translate learned skills from task to task or occupation to occupation. These concepts are broadly applicable to people learning anything new (perhaps especially to adult learners), but for learning digital skills, access or lack of access to digital tools can play a role in confidence, familiarity, and interest. Access to computers and the internet varies across the country. Urban areas tend to have higher rates of computer use and internet adoption than rural areas, though there is much within-city variation. High-income households tend to have greater internet access, and nonwhite households have less. Even though research suggests this gap is closing, there are certain groups (including people who are low income or who live in rural areas) where access to digital tools facilitates the learning of digital skills.<sup>2</sup>

Foundational digital skills are also important to facilitating the use of other skills on the job, such as oral and written communication and teamwork. Tasks requiring these communication and problem-solving skills are less likely to be automated than rote or noncognitive tasks. According to industry sources, these skills are increasingly taking place on digital platforms, including email, file-sharing services, and instant messaging services (e.g., Slack and Google Hangouts Chat).<sup>3</sup> For example, receptionists need competency in using email and online scheduling as well as answering the phone. As a result, these increasingly valuable, less automatable communication and problem-solving skills also require knowledge of digital skills (McAfee and Brynjolfsson 2017; Muro, Maxim, and Whiton 2019).

## Demand for Foundational Digital Skills Is Projected to Increase

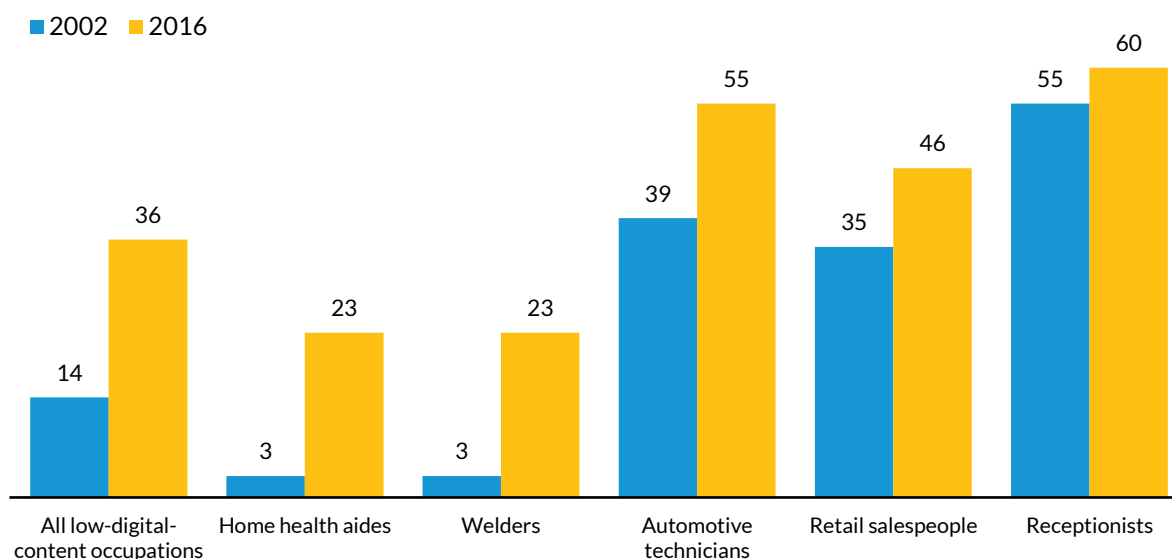
Concerns abound about how technology will change the nature of work. Researchers have worked to measure the demand for specific skills (including digital skills) and to forecast shifts. A burgeoning literature largely agrees that the demand for digital skills has been growing and will continue to do so in many occupations, including occupations that traditionally have not involved technology. Automation is likely to further digitize work, as job tasks shift from routine to abstract and cognitive. Efforts to quantify current and projected demand for digital skills draw on diverse methods, including industry and employer surveys, government datasets, and databases of employer job postings.

## Current Demand

Many jobs require foundational digital skills. One study of employer job postings found that 78 percent of middle-skill jobs (i.e., jobs that typically require a bachelor's degree and pay a living wage) require baseline digital skills. The study defined baseline digital skills as being able to work with "spreadsheets and word processing software."<sup>4</sup>

A Brookings Institution study found a large increase in jobs requiring digital skills from 2002 to 2016. The authors created a digital score for each occupation on a 100-point scale using information from the US Department of Labor.<sup>5</sup> The digital score reflects a combination of the level of digital knowledge the occupation needs, the importance of digital skills for the job, and how frequently technology is used in the job.<sup>6</sup> The study divides jobs into high (score above 60), middle (33 to 60), and low (below 33) digital content based on the digital score. Between 2002 and 2016, the share of all jobs with high digital content more than quadrupled, from 4.8 to 23.0 percent. This reflects both an increase in the digital nature of existing jobs and the addition of new digital jobs (Muro et al. 2017). The share of jobs with middle digital content also increased (from 39.5 to 47.5 percent). Finally, the share of jobs with low digital content, jobs that require less knowledge of digital skills and that use these skills less intensively, fell from 55.7 to 29.5 percent.

**FIGURE 1**  
**Digital Content Scores in Select Occupations in 2002 and 2016**



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**Sources:** Mark Muro, Sifan Liu, Jacob Whiton, and Siddharth Kulkarni, "Digitalization and the American Workforce" (Washington, DC: Brookings Institution, 2017) and supplemental data from authors.

This increase in digital demand cuts across many sectors and occupations. Jobs that traditionally were middle-level digital content, such as teachers, registered nurses, human resource specialists, and secretaries, all became more digital. Even among occupations with traditionally low digital content, the

digital score increased significantly, including for home health aides and welders (figure 1). There has also been an increase in the digital demands among “middle-skill” jobs—jobs that are somewhat accessible because they require less than a four-year degree but can help workers earn a family-sustaining wage and move up (defined here as higher-than-average wages).<sup>7</sup> In 2002, these jobs were low digital content, with an average score of 29. The average score more than doubled by 2016, when the average digital content of these jobs was 50.

## Future Demand

Research suggests the demand for jobs requiring digital skills will increase. The number of jobs requiring digital skills is predicted to increase 12 percent by 2024 (Khan and Forshaw 2017). A McKinsey Global Institute study projects the impacts of automation and growth in demand for different skills, including foundational digital skills.<sup>8</sup> By 2030, the authors project the number of work hours using basic digital skills will increase 69 percent. Increases in hours using basic digital skills will be large in the manufacturing, health care, and energy and mining industries.

These projections suggest employers will increasingly desire workers with foundational digital skills as the digitization of jobs and tasks increases. But employers may not always be aware of their workers’ digital skills. A Google employee summarized this gap in awareness: “We take for granted that people know how to use IT skills, to look online or write an email, but many don’t. Everyone will need them to move forward” (Khan and Forshaw 2017, 15). Sometimes, employees may be able to hide their lack of digital skills, but this may limit their ability to be productive, get promoted, or advance. Inadequate digital skills can thus be an “invisible drag” on productivity and worker mobility—bad for the employer and for the worker (Bergson-Shilcock 2017).

Results from a study of training organizations working with immigrants echo this trend, even for basic tasks. Many occupations that were previously technology-free, such as janitorial work, now require technology for such basic tasks as checking room assignments and filling out time cards (Bernstein and Vilter 2018).

The literature suggests that the demand for digital skills will continue to increase even as automation becomes more common. And this increase in demand will happen across the board. Occupations as diverse as construction and nursing are likely to see more digitally intensive tasks and therefore greater demand for workers with foundational digital skills.

## Foundational Digital Skills Are Needed for Job Search and Online Education

The importance of digital skills for workers goes beyond rising demand in the workplace. Digital skills are increasingly used in elementary and secondary school classrooms, for banking and shopping, for interactions with government, for entertainment, and for social connection. And digital skills are increasingly important in searching for a job and attaining new skills.

Job search and application are increasingly taking place online. This includes formatting a résumé in Microsoft Word, converting it to an Adobe PDF and posting it online, searching for job openings, reaching out or responding to employers via email, or applying via online interfaces. In a 2011 study, 73 percent of unemployed internet users reported going online to look for work, as did 52 percent of underemployed users (US Department of Commerce 2013). An informant in one study noted that “the increased use of electronic job applications makes it difficult for those with low literacy skills to get a job” (Bergson-Shilcock 2017, 9). Online tools are now the most important resource for many job seekers, and many even search for jobs on mobile devices (Smith 2015). Despite this, only 14 percent of people with low digital skills say the internet is “very” or “somewhat” important to a job search, compared with more than half of people with high digital skills (Horrigan 2014). Bernstein and Vilter (2018) also found that people lacking basic computer skills cannot use online job search and workforce development tools. Providers bear an increased burden when walking clients through computer navigation, taking valuable time away from other service delivery (Bernstein and Vilter 2018). One survey echoes this mismatch, finding that many Americans lack the confidence to search and apply for jobs online. Nearly 20 percent of Americans indicated it would not be easy for them to create a professional résumé or to highlight their employment skills using social media (Smith 2015).

Participation in education and training to improve skills may also be hampered for people lacking foundational digital skills. Many basic skills assessments that public workforce centers and community colleges use are conducted online. The GED and other high school equivalency tests are also available almost entirely online. College and credentialing curricula have transitioned to more online learning as organizations leverage technology to cut costs and provide flexible learning environments for students who work or have families. Almost one-third of students in higher education took an online class in 2016 (Seaman, Allen, and Seaman 2018). These options are more difficult to access for people without basic digital skills. Finally, digital literacy can play an important role in other aspects of life, such as broadening social networks, accessing news and information, and connecting with the community (Robinson et al. 2015).

## Many Workers and Job Seekers Lack Foundational Digital Skills

As the need for a digitally literate workforce increases, an understanding of how many workers and job seekers have or do not have basic digital skills is vital for education and training efforts. Our review of the research shows that many US workers and job seekers lack foundational digital skills. There are limitations to what is available, and some measures are several years old. Given the fast-paced changes in the digitization of many facets of our lives, we need more recent information on the digital skills of the workforce.

## Digital Skills in the Population

Many workers and job seekers lack foundational digital skills. Given the range of what digital skills entail, assessments of skill levels can vary.

A common source of information on digital skill levels is the Organisation for Economic Co-operation and Development’s Program for the International Assessment of Adult Competencies (PIAAC). This assessment, most recently conducted in 2011–12, provides representative results for the US population. The PIAAC captures the range of foundational digital skills from basic familiarity and ability to operate digital technology to the ability to use technology in work settings to solve problems.<sup>9</sup>

Results of this assessment are broken into five “levels”: no digital skills, below level 1, level 1, level 2, and level 3 (table 1). The difference between level 1 and level 2 reflects the difference between learning to complete a discrete task on the job and being able to transfer that knowledge to a novel context.

TABLE 1

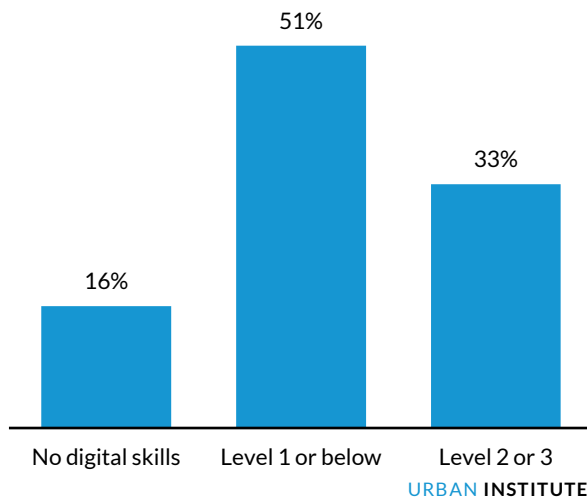
Scoring Levels: Program for the International Assessment for Adult Competencies

Level	Definition	Example
No digital skills	Participants did not take the digital assessment because they failed the basic screener test for being able to use the computer or indicated they have never used a computer.	Not applicable
Below level 1	Participants perform well-defined tasks that require the use of only one function within a generic interface but are not proficient enough to navigate technology applications or use specific tools and functions (i.e., a sort or find function).	Navigating across multiple pages of a web browser and using an application in tandem
Level 1	Participants use static technology requiring little to no navigation or facilitation tools to complete single-step tasks requiring well-defined cognitive problem-solving processes.	Basic navigation on a web browser or basic email processes
Level 2	Participants can use more advanced technology (e.g., web-based services and the accompanying navigation) and use technological tools to facilitate operations. Tasks are multistep, and problem-solving processes are less well defined and involve surmounting barriers and employing inferential reasoning.	Using a sort function to identify the number of entries in a spreadsheet that match criteria found in a different application
Level 3	Participants can complete tasks that demand a higher cognitive process, including a high level of inferential reasoning and evaluation of relevance and reliability of information.	Scheduling a meeting using a new web application with multiple constraints, including booked rooms and participant schedules

The 2011–12 results show that about 16 percent of 16-to-65-year-olds lack basic digital skills (“no digital skills”), or roughly 32 million Americans (figure 2). Fifty-one percent scored a level 1 or below, meaning they have some basic digital skills but lack a level of digital literacy. The remaining 33 percent of Americans scored level 2 or above. People who lack basic digital skills have a lower rate of labor force participation than those who do not, and they tend to work in low-skill jobs (Mamedova, Pawlowski, and Hudson 2018).

FIGURE 2

**Digital Scores on the 2011–12 Program for the International Assessment for Adult Competencies**



**Sources:** Authors’ calculations of Program for the International Assessment for Adult Competencies data; and Saida Mamedova, Emily Pawlowski, and Lisa Hudson, *A Description of US Adults Who Are Not Digitally Literate* (Washington, DC: US Department of Education, Institute of Education Sciences, National Center for Education Statistics, 2018).

Studies using other data sources and definitions also find that many adults lack foundational digital skills. A 2013 study of broadband users surveyed respondents on how well they understood online terms, how easily they could find information using a computer and a mobile device, and how comfortable they felt using a computer. Twenty-nine percent had little familiarity with digital terms (Horrigan 2014). Although knowledge of online terms might be a higher bar than use of digital tools, the respondents did not include people who lacked access to broadband and who may be even more likely to lack this knowledge.

### Digital Skills Vary across Groups

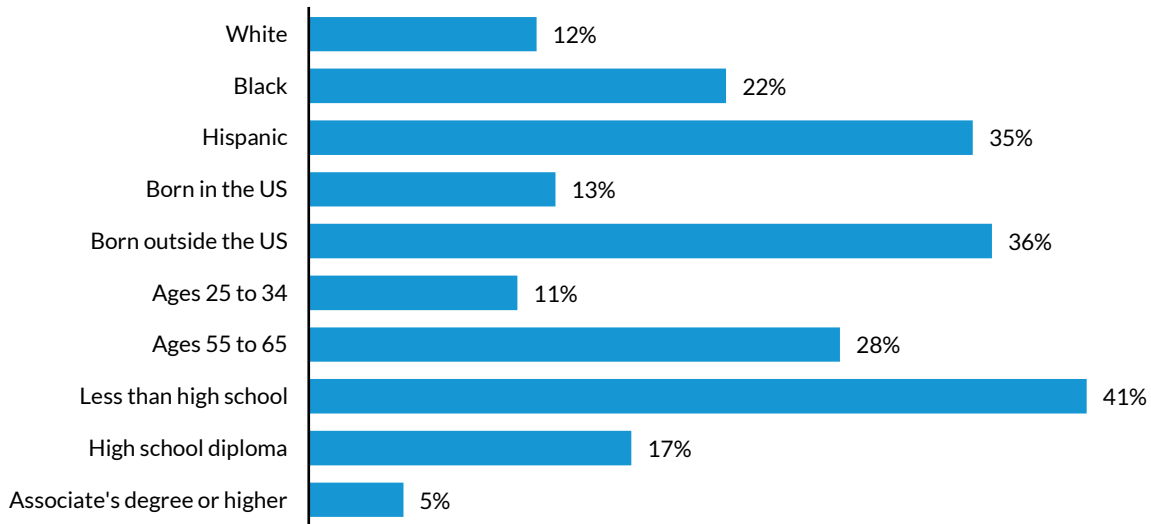
Some groups are far more likely to lack digital skills. Those who have less education, are older, or are black or Hispanic have lower digital skills, on average. Figure 3 shows the share of adults in different subgroups who fall into the “no digital skills” group.

Other analyses find certain groups have a disproportionately higher lack of basic digital skills. One study found that of 40 different skill areas, the skill gap in knowledge of computers and electronics is the most pronounced gap for workers age 50 and older (Mikelson, Kuehn, and Martin-Caughey 2017). Even though young adults are sometimes thought of as “digital natives,” research suggests that this age group is not homogenous. Young people differ in their access to and use of technology by, for example, socioeconomic status, gender, and geography, and this affects digital knowledge (Selwyn 2009). Low digital literacy is also common among people whose first language is not English. Digital skill deficiencies may be exacerbated and more difficult to teach to people who lack English skills (Bernstein and Vilter 2018).



FIGURE 3

**Adults Assessed as Having No Digital Skills on the 2011–12 Program for the International Assessment for Adult Competencies**



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Source: Saida Mamedova, Emily Pawlowski, and Lisa Hudson, *A Description of US Adults Who Are Not Digitally Literate* (Washington, DC: US Department of Education, Institute of Education Sciences, National Center for Education Statistics, 2018).

Inequities in foundational digital skills may be partially attributable to disparities in access to the internet. Internet use and access differ widely. Nonwhite, older, less educated, and less affluent people, as well as those who live in rural areas, have limited internet access, though evidence shows that access is increasing (Council of Economic Advisers 2015; US Department of Commerce 2013; Zickuhr and Smith 2013).

## Providing Foundational Digital Skills

The gap between workplace requirements for foundational digital skills and current abilities in the population suggest training to improve digital skills is important. To better understand where and how people can gain these skills and providers' perspectives on strategies and challenges involved in this work, we reviewed web-based materials and spoke with five providers representing organizations and settings offering foundational digital skills training. We talked to the director of a large urban library; the director of workforce training programs at a community college, including a health care training program for Temporary Assistance for Needy Families (TANF) recipients and other low-income people; the director of a city workforce development board; the director of a city adult basic education program; and the director of community-based programs for older workers, including a Senior Community Service Employment Program.

This section describes what digital skills training looks like, providers' perspectives on the need for foundational digital skills training, and their strategies and challenges in providing this training. Given the limited sample we interviewed, this should be viewed as an initial step to better understanding the provision of foundational digital skills.<sup>10</sup>

## **What Does Digital Skills Training Look Like?**

Many organizations provide foundational digital skills training to prepare people for learning, work, and life. These organizations include public workforce centers, local workforce development programs, community-based service organizations, adult basic education programs, community colleges, and libraries.<sup>11</sup> Providing digital skills training is not new. One respondent said libraries have been engaged in computer trainings since the 1990s.

Digital training spans one-on-one short help sessions to full-length courses offering credentials. Digital training can take place in stand-alone sessions or be integrated into job search workshops, occupational training, adult basic education, and other types of learning. Training occurs on the job, in the classroom, and as self-guided online training.

## **Provider Perspectives on the Need for Digital Skills Training**

Providers working with job seekers reaffirmed what we see in the data: entry-level and middle-skill jobs increasingly require digital skills, and not having these skills can hold workers back. One respondent referenced a program participant who worked for many years as a cashier at a grocery store using a computer system to ring up customers but lacked the skills to use a computer in broader tasks, so she could not advance to a higher-paying job within the company. Another respondent spoke about their work with a large employer managing a parking service, where jobs that previously did not require digital skills now require them (e.g., ticket takers in the booth use a computer, and parking attendants use handheld computers to track clients and for insurance purposes).

Providers also noted digital skills are needed to apply for jobs, as more employers use online applications and assessments. One job seeker was unable to catch a bus because he was unable to use the mobile app to determine the right route and timing. One could imagine this being a barrier to traveling to a job interview on time, for example. Digital skills are required to even access many of the public workforce programs helping job seekers with job searches, other workshops, or occupational training. One local workforce board requires job seekers to do initial job research before making an appointment with an employment counselor. This initial research needs to be done on the computer and requires knowledge of how to search for information on the internet. Similarly, assessments used by community colleges are often online, and most occupational training and education uses computers, the internet, and information portals for everything from online classes to supplemental materials and homework for in-person classes.

For the most part, providers did not have hard numbers on the level of digital skill needs among the people they served. But all providers found a mix of digital skill knowledge, with a significant group

lacking digital literacy—the ability to not only conduct specific digital tasks but transfer digital knowledge for problem solving. Although a minority of participants in programs serving adult learners needed the basic skills (e.g., how to use a computer or mouse or get on the internet), it was more than “a few.” Several providers estimated at least 10 percent of participants fell into this category. A telling fact is that the workforce board that required an initial job search before making an appointment also fielded a workshop to help people who needed assistance completing this task.

The types of participants needing training on foundational digital skills varied as well. Most providers acknowledged that young people seemed to have fewer needs than older people, often because of greater exposure to digital skills in school or through smartphone use. But one provider serving older job seekers noted that an increasing number of older people use smartphones. This provider also noted that older people without digital skills are not necessarily less educated or without other skills. Older workers who get laid off and need to transfer to new occupations sometimes struggle with the digital skill dimension of new jobs, despite years of work experience. Another digital skill provider noted that fluid use of a smartphone does not always translate to broader digital skills. Some young people who were experts with smartphones were not able to easily transfer their knowledge into a work setting where they needed to use computers and office software and tasks.

## Strategies for Teaching Foundational Digital Skills

Though the types and target populations of digital skill providers we spoke with varied, we found common themes and strategies that program providers should consider when teaching foundational digital skills.

**Teach skills in context.** Like other types of foundational skill learning, providers felt learning digital skills worked better for participants when taught in the context where they would be used. Even at the most basic level of digital skills, learning how to use a tool or do a specific digital task is easier if done as part of a real work task. Several providers teach job seekers digital skills while they teach them how to make résumés or search the internet for job openings. Another provider noted that the Senior Community Service Employment Program requires that participants enter subsidized work quickly, so there is not much time for digital skills training before entering subsidized work placements. But because these jobs were subsidized transitional jobs, older participants were able to learn digital skills on the job in a low-stakes environment.

**In-person teaching is important.** Our review of program curricula and web-based materials shows that many online classes, modules, and assessments are available for teaching digital skills (e.g., Google Digital Training and Northstar Digital Literacy), and many providers serving adult learners use these online tools. Some are meant to be self-guided, but some providers emphasized the importance of having an in-person component of training or in-person assistance available, especially for people with low digital skills. These participants may lack confidence or fear working in the digital space and need encouragement to get started or follow through. One provider spoke of “humanizing” the experience by having staff available. This is true even when much of the teaching is online. A workforce program serving people who are low income and TANF recipients at a community college noted there were

plenty of computer rooms and general workshops on campus, but having a staff person who could answer questions and assist with digital learning and understood participants' circumstances was important.

**Match training to people's needs.** All the providers acknowledged a range of digital skill needs among the people they served. Providers had several offerings and ways of meeting participants' needs. At the public library, people could drop in to get one-on-one help or sign up for classes teaching anything from basic digital skills to Microsoft Office software. Public workforce centers offered trainings spanning from basic workshops to advanced training. The community college occupational training program discussed what digital skills were needed in classes providing health care training. Another program used community listening sessions to better understand needs that are often overlooked. Providers have to be careful not to overlook the needs of people without basic digital skills in other programming. One program uses an online training portal to assess barriers to workforce participation, without considering participants' lack of basic digital skills. Another pointed out that teaching an English as a Second Language class on computers would be impeded by some participants' lack of digital skills.

**Access to digital tools is connected to digital literacy.** Providers noted the connection between access to digital skills and digital skills themselves. If digital literacy depends in part on familiarity, having regular access is key. Organizations have taken innovative approaches to expand access in conjunction with teaching digital skills. One organization loans out Wi-Fi hot spots through community partners (about 250 hot spots can be loaned for up to six months) so people can access the internet from anywhere. Another example is Philadelphia's KEYSPOt Network, which compiles information about computer centers at different organizations that offer digital skills and computer access. A program teaching occupational skills to TANF recipients and low-income people took access a step further. The program loans participants laptops (and wireless internet routers) they can keep if they complete the program. This is an incentive for completing the training and allows for greater and more flexible use of the computer, increasing digital skills. It has the additional benefit of alleviating related barriers, such as eliminating the need for child care for parents to go to a computer room, and allows participants' children to gain digital familiarity as well.

## Challenges for Teaching Foundational Skills

Our discussions with providers unearthed common challenges in teaching foundational digital skills.

**Choosing training and assessments.** Many trainings and assessments teach digital skills. Figuring out which to use can be difficult, especially with limited information on efficacy and how specific trainings and assessments fit the needs of different populations. Providers had questions about whether trainings would meet the needs of people with low basic skills, how to assess the effectiveness of different tools, and whether completion of a certification is valuable to or recognized by employers.

**Funding.** Raising funds for digital skills training is an issue for providers. But the benefits of having in-person staff to help with digital training and the costs of providing access to digital tools are

considerations. The program that provides laptops reported costs were not necessarily that high but warned that maintenance costs need to be included.

**Meeting the needs of non-English speakers.** Specific populations present specific issues in teaching digital skills. English language learners who lack digital skills have dual needs. One provider approached this by teaching basic digital skills in participants' native language while including English learning and, in some cases, assistance in securing citizenship. Another provider used a mix of one-on-one and classroom offerings to help people learning English develop basic computer skills. One program described learning basic digital skills as its own language and approaches the issue by holding off on teaching digital literacy until participants reach a certain level of English proficiency.

**Moving to digital literacy.** The levels of foundational digital skills outlined above resonated with the providers we spoke with. One respondent talked about digital skill learning in stages of initial familiarity and then "higher-level fluency that might allow for translation and problem solving." But multiple respondents suggested it is not clear how to train people to move from this initial level to more fluency. Regular access to technology to gain familiarity and learning digital skills in context seem to be part of the answer.

## Conclusion

The rapid integration of technology into most aspects of life has prompted various reactions, from fear of job loss and a decline in human interaction to promises of interconnectedness and improved efficiency and mobility. Research has been and is being conducted to better understand these changes in the context of the labor market. This research generally agrees that the demand for digital skills in nearly all occupations is increasing, including for occupations not traditionally thought of as digital. To be able to advance in the labor market, workers need foundational digital skills: nonspecialized digital skills important for carrying out many jobs but not the job's main substance. Many workers and job seekers lack these skills. People lacking basic digital skills are disproportionately older, less educated, immigrants, or workers of color. Closing this gap requires providing digital training, especially to adult learners and workers displaced from occupations. Training and education providers need to develop programs that teach job seekers and workers to build foundational digital literacy.

Some organizations providing workforce training and employment assistance are employing strategies to teach foundational digital skills. Helpful strategies emerging from this study include the following:

- Providers should not overlook the need for foundational digital skills in job seeking and employment.
- Explicit assessment of digital skill level can be helpful to understand needs, including discerning between basic task completion and higher-level cognitive problem solving with technology.
- Integrating basic foundational digital skills trainings into existing workforce development programs can be a useful way to meet job seeker and worker needs.

- Online trainings should address digital skill needs to ensure participants can successfully navigate courses.
- Access to digital tools (computers and internet) plays a key role in people becoming digitally literate and should be accounted for in training programs.

The study also suggests areas where we need more information. Although many types of organizations offer digital training, we do not know all the barriers to accessing appropriate digital training, particularly for people with low levels of digital skills. Providers seeking to use existing digital skill assessments and trainings need more information on their effectiveness and whether employers value associated credentials. Lastly, providers need to know more about what kinds of training are most effective for teaching foundational digital skills, including basic and discrete tasks and the ability to transfer this knowledge across jobs and platforms, solve problems, and adapt to new technological settings.

Work increasingly requires more digital skills. Better understanding the skills people lack and how best to provide them can inform efforts to train and retrain job seekers for the modern workforce.

## Notes

- <sup>1</sup> Other studies define “digital literacy” at a more elementary level, such as showing basic familiarity with digital tools. See Mamedova, Pawlowski, and Hudson (2018).
- <sup>2</sup> An analysis of 2013 American Community Survey data found that the digital divide has narrowed since 2001, particularly for the demographic groups with lower initial adoption. A 2019 Pew survey showed a substantial increase in the online population of older adults and people with low educational attainment. See Monica Anderson, Andrew Perrin, Jingjing Jiang, and Madhumitha Kumar, “10% of Americans Don’t Use the Internet. Who Are They?” *Fact Tank* (blog), Pew Research Center, April 22, 2019, <https://www.pewresearch.org/fact-tank/2019/04/22/some-americans-dont-use-the-internet-who-are-they/>. See also Council of Economic Advisers (2015).
- <sup>3</sup> See John Rooney, “The Growing Importance of Digital Skills in the Workplace,” Training Industry blog, June 20, 2017, <https://trainingindustry.com/articles/it-and-technical-training/the-growing-importance-of-digital-skills-in-the-workplace/>; Salesforce Research (n.d.); and Alex Gay, “How Digital Literacy Affects the Modern Workforce,” Adobe blog, March 14, 2019, <https://theblog.adobe.com/how-digital-literacy-affects-the-modern-workforce/>.
- <sup>4</sup> Bradley and Restuccia (2017) report that about 46 percent of jobs are middle skill by this definition.
- <sup>5</sup> The information is from the Department of Labor’s O\*NET measures of digital knowledge of computer and electronics and extent of interaction with computers as a work activity.
- <sup>6</sup> This is not the same as the level of digital skill required. For example, a construction job that requires a worker to use the computer for much of the day may have the same digital score as a programming supervisor job that requires a higher level of digital skills but fewer hours spent using technology.
- <sup>7</sup> See Holzer and Lerman (2008) and Burning Glass Technologies, “Which Middle-Skill Jobs Will Last a Lifetime?” Burning Glass Technologies blog, June 20, 2018, <https://www.burning-glass.com/blog/which-middle-skill-jobs-will-last-lifetime/>.
- <sup>8</sup> McKinsey Global Institute (2018) estimates the amount of time workers spend on each skill today and projects how skill demand will shift by 2030. Analysis at the hour level better captures variation and nuance of digital tasks within individual jobs. The study includes in basic digital skills hours “pure IT activities,” such as operating a

computer. To account for the importance of basic digital skills in many non-IT jobs, it also counts a portion of hours from non-IT activities as basic digital skills using the digital score from Muro and coauthors (2017).

<sup>9</sup> The PIAAC measures digital skills through an online assessment of “problem solving in technology-rich environments.”

<sup>10</sup> The interviews discussed program curricula, perspectives on the need for digital skills training among participants, the use of assessments for digital skills, and challenges in providing digital training.

<sup>11</sup> Public K–12 education systems also teach digital skills, but we focus only on adults and out-of-school youth.

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