DIGITAL SKILLS FOR AN
EQUITABLE RECOVERY

Policy recommendations to address the digital skill needs of workers most vulnerable to displacement

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NATIONAL SKILLS COALITION
Every worker. Every industry. A strong economy.

> **"** To succeed in this rapidly changing environment, workers need broad-based digital problem-solving skills that equip them to learn a wide variety of today's technologies and navigate continued changes in the future.

Even before the Covid-19 pandemic, it was apparent that American jobs are undergoing massive technological transformation. In-demand careers increasingly require digital literacy skills, and for many industries digital skills are entry-level competencies for new hires and incumbent workers. Since the pandemic, digital demands in the U.S. workplace have only accelerated, with workers from frontline jobs to white-collar roles being asked to quickly adapt to new tools and technologies. To succeed in this rapidly changing environment, workers need broad-based digital problem-solving skills that equip them to learn a wide variety of today's technologies and navigate continued changes in the future.

But at least 48 million U.S. workers lack these foundational digital skills, and even more lack access to the high-quality training which would empower them to increase their skills to meet future technological shifts.[1] While digital skill gaps exist in every demographic group, workers of color are disproportionately affected, in large part due to structural factors that are the product of longstanding inequities in American society.[2] Historically, public policy decisions have played a key role in forming skill gaps, including those that are racially inequitable. Therefore, public policies must now be an integral part of the *solution*.

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Despite the wave of new public attention to digital issues spurred by the Covid pandemic, policy changes have not yet caught up. Our country's adult education and workforce systems are underfunded—and too often not adequately aligned—making it impossible for these systems to fully address the current challenge. Businesses attempt to fill the gap, but no single company can do it alone.

To meet the needs of today's and tomorrow's workers and businesses, policymakers must invest in the opportunities and supports workers need to upskill and effectively work with new technologies. This means defining and assessing digital literacy among U.S. workers in an occupational context. (Notably, quantifying occupational digital literacy skills across industry sectors does not require creating multiple assessments for digital literacy specific to each sector. Rather, a single baseline assessment could test for foundational occupational digital competencies, and then industry partners could confer on supplementary competencies specific to their sector to train workers for in on-the-job or contextualized training settings.) More importantly, it will require making significant, targeted investments in digital literacy and problem-solving skills, and supporting the sector partnerships that bring industry together with education and workforce providers to ensure that training programs meet businesses' talent needs.

Measuring and improving digital literacy skills for current and future workers

Digital literacy is a key determinant of future employability for most entry-level workers, but far too few workers have access to these skills now, primarily due to a fragmented system and lack of investment. As the Covid-19 pandemic has made clear, ensuring that the U.S. can provide digital literacy and problem-solving skills to all workers will necessitate policy solutions with the following components:

1. **Make a federal commitment to occupational digital literacy and create a new national grant program, or Digital Literacy Upskilling Grants, to expand access to high quality digital skills instruction that meets industry and worker needs.** The federal government should allocate funds to states to administer grants and create a new national grant program to invest in digital skills training best practices across the country. These funds should be available to contextualize digital skills instruction for specific industries, increase instructor professional development, support training costs of incoming and incumbent workers and include a state set-aside to support the development of digital literacy skill gain metrics as part of state postsecondary attainment goals.

WHAT IS "DIGITAL LITERACY?"

The American Library Association defines digital literacy as "the ability to use information and communication technologies to find, evaluate, create, and communicate information, requiring both cognitive and technical skills." However, digital literacy has a variety of meanings depending on context.

To account for this, National Skills Coalition proposes a new definition to describe occupational digital literacy and problem-solving skills which provides more specificity on the practical implementation of digital literacy skills at work. **To that end,** *occupational digital literacy and problem-solving skills* **conveys the cognitive and technical skills that equip individuals to use information and communication technologies effectively within a specific occupation or occupational cluster for the purpose of career advancement and workplace success.**

2. **Develop a measurable national standard for industry-specific digital upskilling efforts.** Congress should define and embed occupational digital literacy in workforce and education policies like Workforce Innovation and Opportunity Act (WIOA) Title I and II, backed by funding to support quality digital skills training through existing policies as well as the new Digital Literacy Upskilling Grants described above. In addition, the Department of Education, in collaboration with the Department of Labor, should conduct a national "digital literacy audit" around education and employment outcomes: Evaluating what skills workers currently have, assessing current and future industry demands for digital skills, and developing a strategy to close the gap.

3. **Create a network of "21st Century Industry Partnerships" between businesses, education providers, the public workforce system and community organizations.** Industry and sector partnerships will ensure that the significant investments necessary to respond to digital literacy upskilling needs caused by technological changes in the workplace are aligned with employment opportunities in in-demand industries. By helping businesses work together with education and training providers, these partnerships can ensure industry-driven solutions that equip workers with skills that match local employers' hiring needs.

4. **Incentivize private investment in digital skills training, instruction, and upskilling opportunities for incumbent workers by expanding the scope of existing tax policies.** While tax credits such as the Workforce Opportunity Tax Credit (WOTC) currently help drive private investments in recruitment and training, the future of work will require more robust incentives. Specifically, preferencing work-based learning and upskilling for incumbent workers as eligible costs under WOTC will help kickstart private investment in essential digital skills training.

Disruption and digitalization demand updated digital skill-building

Even before Covid-19 upended business-as-usual, technological change was slated to fundamentally disrupt the American economy and labor market. Experts now anticipate a Future of Work defined less by job elimination than by job *transformation* and the demand for new skills to accomplish new jobs.[3] Workers with ready access to traditional education and training opportunities will benefit from these upskilling opportunities in the face of uncertainty.

However, for the anticipated 23 percent of U.S. workers facing automation-related displacement by 2030,[4] workers facing displacement due to ongoing pandemic-related structural changes in the labor market, and the millions of U.S. workers who have been systemically excluded from formal education and training opportunities—because of their race or ethnicity, income, prior schooling, sexual identity or gender expression, immigration status, neighborhood, or otherwise—the threat of technological disruption is present and urgent. Digital displacement can be exacerbated by foundational skills gaps in areas such as spoken English proficiency, numeracy or digital problem-solving skills, which can further bar individuals from opportunity and on-ramps to opportunity.[5]

Digital literacy and problem-solving skills are fundamental to weathering current and future technological disruptions. While this paper focuses specifically on digital **skills**, workers also need full access to digital devices and reliable home broadband connections to be fully effective in a digitalizing economy. Even before the pandemic, the nature of work was already transforming to depend on new digital systems, processes, and skills.[6] For many industries—especially those with more highly automatable roles or more easily digitized functions—digital skills are a vital threshold competency for the new hires and incumbent workers businesses depend on. Without these skills, workers are being left behind.

The consequences of digital skill gaps are present now: At least 48 million U.S. workers lack digital skills. In particular, across all industries, data show that nearly one-third (31 percent) of all U.S. workers lack digital skills. This number includes the 13 percent of overall workers who have *no* digital skills and another 18 percent who have *limited* skills, according to a National Skills Coalition and American Institutes for Research analysis of data from the Organization for Economic Cooperation and Development (OECD) Survey of Adult Skills, also known as the PIAAC.[7] [8] Additionally, more than one-third of workers who lack digital literacy are nevertheless employed in positions that require substantive computer skills[9] and one-third of workers with limited digital skills are *supervising* other employees.[10] Workers' skill gaps serve as an invisible drag on productivity, with supervisors' gaps functioning as a bottleneck that prevents more rapid adoption of technological skills across teams.[11] Without targeted interventions, digital skills gaps will continue to harm both workers and businesses.

> " **Many of the same workers who can least readily access the education and training necessary to prepare themselves for labor market transitions** are also bearing the brunt of labor market disruptions.

Digital literacy skill gaps exist in every industry

Digital literacy is both a significant challenge to and a key determinant of future employability for the American workforce. Many of the same workers who can least readily access the education and training necessary to prepare themselves for labor market transitions are also bearing the brunt of labor market disruptions.

Workers who face one or more barriers, such as limited educational attainment or low earnings, are less likely to pursue upskilling opportunities—though not for lack of interest on their part. Previous research shows that workers want to upgrade their skills for the 21st century, but external factors like financial constraints, difficulty getting time off work, accessibility of relevant training opportunities, and childcare responsibilities are holding them back.[12]

Digital disruption and skill gaps equally threaten workers and businesses. Every industry in America faces significant digital skill gaps in its workforce. Yet, there is still variation across industry sectors. For example, the construction, transportation, and storage sectors have the highest number of workers without digital skills; fully half of all workers (50 percent) in these sectors lack digital skills.[13] While it might seem as though these industries simply don't have much need for digital skills, in fact that is not the case. Research from the Urban Institute affirms the growing urgency of foundational digital skills for all workers, including those in essential frontline roles such as home health aides and janitors.[14]

More than one-third of workers in numerous other sectors have few or no digital skills, including retail, wholesale, and auto repair (37 percent); hospitality and other services (36 percent); manufacturing (35 percent); and administrative and support services and arts, entertainment, and recreation (35 percent), just to name a few. The threat of digital skill gaps could not be more pressing: right now, one third (33 percent)[15] of healthcare and social workers have no or limited digital skills, meaning they are less able to deploy emerging remote and digital health tools that respond to the Covid-19 pandemic.[16]
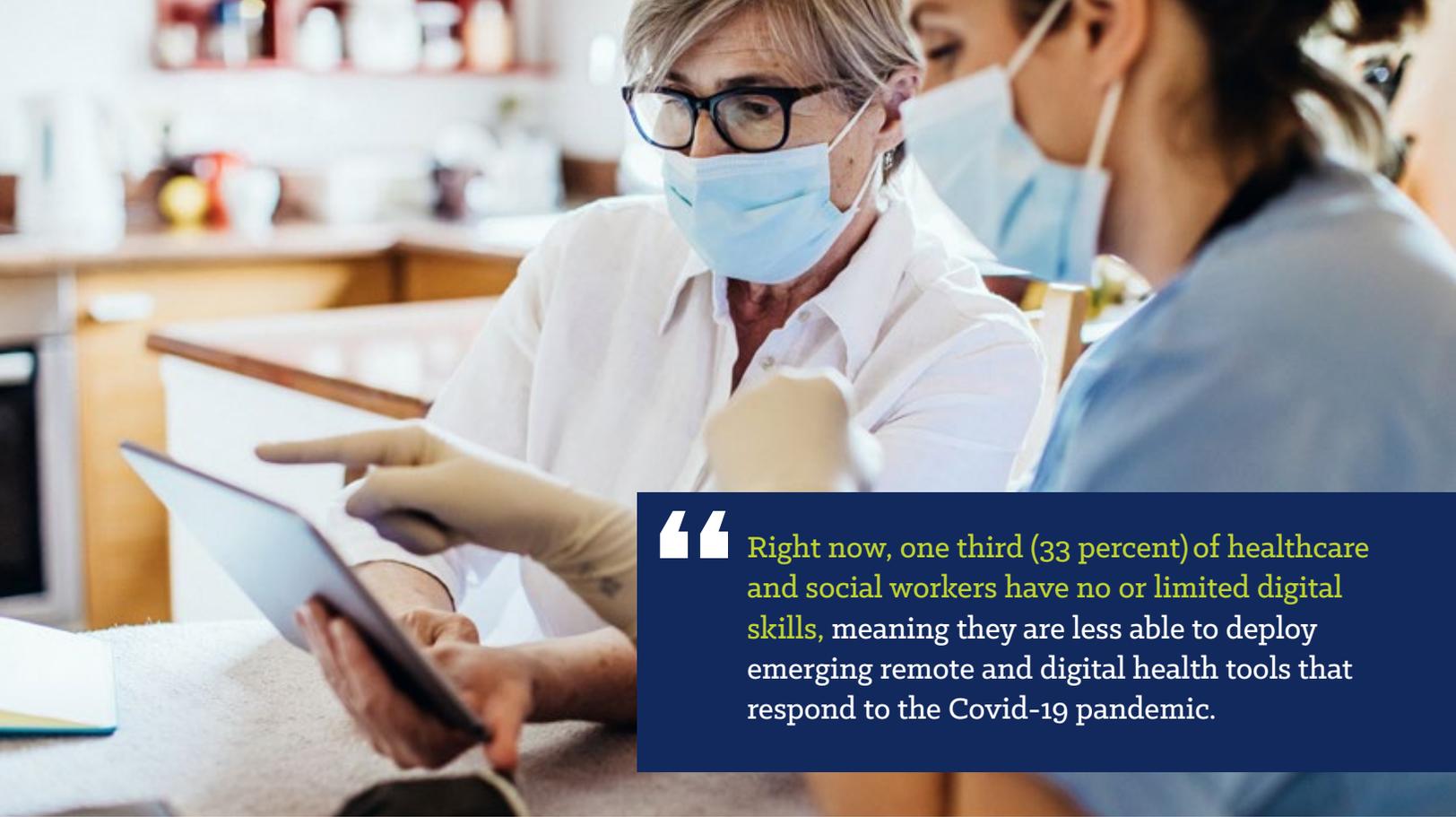
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This wide-ranging impact of digital skill gaps across industries has multiple implications for communities, business leaders, and policymakers. Ultimately, it brings home the fact that policy solutions must be multi-sectoral and shows that workers who struggle in one industry because they lack key digital skills cannot simply escape to a new industry where such skills are unnecessary.

In a rapidly digitalizing economy, technology is constantly evolving to meet consumer demand. The flip side of this transformation falls on employers and workers, who must work to swiftly deploy new technologies and upskill to integrate them into daily tasks. Rapid adoption of Bluetooth use has enabled hotels to adopt "mobile key" products which allow guests to lock and unlock their rooms via a smartphone app. On the back end, this shift can drive efficiency for hotel employees and eliminate the need to replace room keys, but only if employees have the digital skills necessary to work with this new tech.

Source: Esther Hertzfeld, "Why mobile key is taking over in hotels," *Hotel Management*, Dec. 13, 2018,

Lack of standardized digital skills definition, measurement, and assessment tools

Digital literacy needs are universal in modern life, though interface and system use vary across personal and professional settings. For example, individuals who struggle to use word processors or web conferencing in professional environments might be comfortable using mobile messaging tools like WhatsApp or social media sites like YouTube. This variation in digital proficiency is called fragmented knowledge and is very common among workers—even with so-called "digital natives" or younger workers who grew up using digital technologies.[17] (Nearly one third of workers with limited digital skills are younger than 35.)[18] Understanding the paradox of fragmented knowledge is important because it can help policymakers and advocates avoid making assumptions about who lacks digital skills and why, and which interventions could help them build skills.

In addition, some digital skill needs and standards are industry-specific. Understanding and quantifying digital skills across industries will first require establishing a host of baseline digital competencies that prepare new and incumbent workers for entry-level positions. From there, additional industry specific competencies and trainings can be identified and scaled. The responsibility of deter-

mining standards and definitions should fall to both the Office of Career, Technical and Adult Education (OCTAE) within the U.S. Department of Education and the Department of Labor's Employment and Training Administration (DOLETA). As part of this process, these agencies should also consult with the National Telecommunications and Information Administration (NTIA) within the U.S. Department of Commerce, which principally handles issues of broadband access and expansion as well as others that have implications for digital inclusion. While OCTAE and DOLETA will handle the lion's share of determining quality standards, NTIA will be an essential partner in coordinating intersecting conversations of digital skills and access to digital devices and quality home broadband with other federal agencies and policymakers, especially as that agency is increasingly written into legislation which aims to extend connectivity in a post-pandemic society.

Ensuring workers can build digital skills for today and for the jobs of 21st century will require policy solutions that look at digital skills across contexts while allowing local areas and industry to respond in a way that enables workers to upskill *through* labor market disruptions and not simply react after the fact.

Despite the overwhelming digitalization of work and work activities in the U.S. economy, formal references to digital literacy in federal policy are scant.[19] Most notably, the Workforce Innovation and Opportunity Act (WIOA) Title II identifies digital literacy as one of numerous "workforce preparation activities," which help develop the skills necessary for successful transitions into postsecondary education or training, or employment.[20] [21] To adequately adapt to technological workforce changes, the definition of digital literacy skills must be updated to reflect real-world challenges and industry-specific applications.

Jobs across the United States increasingly require digital literacy skills. This is not limited to workers in the information technology field or those with college degrees; even entry-level workers in agriculture, healthcare, and hospitality are now required to effectively use technology to do their jobs. For example, Kentucky Fried Chicken now trains workers on food safety using virtual reality goggles, while agribusiness giant Taylor Farms is training human workers to collaborate with robots in packing vegetables. Digital skills and skill needs are also increasingly present in sectors like construction that are traditionally characterized by physical labor rather than technology use, though this perception is changing.

Source: *The New Landscape of Digital Literacy* (National Skills Coalition, May 2020).

A NOTE ON FRAGMENTED KNOWLEDGE

Fragmented knowledge is an uneven familiarity with digital applications (e.g., a worker may be comfortable using a mobile phone to text a photo, but not familiar with how to operate a mouse or upload a job application). It is common among Americans of all ages, but more likely among individuals who do not own a desktop or laptop computer and those who have smartphone-only internet access.

Workers with fragmented knowledge may be adept in navigating certain digital tasks they use in their daily lives, yet also be held back from advancing in their careers due to a lack of digital problem-solving skills.

Policymakers and advocates seeking to help these workers upskill should be careful not to underestimate their ingenuity and expertise. In particular, leaders should ensure that workers have a voice in identifying what skill-building opportunities they need, what support is necessary to ensure their success, and how their employers can most effectively be engaged in upskilling conversations. Labor-management partnerships are one proven model for this type of collaborative program design.

Source: For more on fragmented knowledge, see *The New Landscape of Digital Literacy*, National Skills Coalition, 2020.

Without a standard way to quantify employees' occupational digital skills, training providers and employers are at a loss to determine the core competencies which undergird digital fluency at work.[22] The incomplete understanding of digital literacy needs within the workforce is due, at least in part, to the lack of a shared definition and measurement tools for occupational digital literacy. Lack of a shared language around digital competencies, what metrics demonstrate digital understanding and how to assess existing digital skills limits capacity to standardize upskilling methods and best practices across industries.

Lack of funding and variations in quality of digital instruction

Learning institutions—whether they exist within the K-12, postsecondary or adult education systems—have unevenly and imperfectly integrated digital learning into traditional frameworks. Often, the commitment to digital skills instruction, if present at all, is supplemental and not integrated into curriculum. Expanding this commitment to upskilling incumbent workers is constrained first by funding. National funding for adult education is woefully small (among the lowest of the world's advanced economies) and pressures from new technologies are putting workers with less education and training even further behind.

Among those institutions who have embraced digital learning, there is a wide variety of digital skills instructional and program models of varying quality and limited standardization. Digital literacy learning opportunities vary dramatically both in terms of context—from informal library-based "learning circles" to region-specific community college coursework—and platform, including in-person instruction; online-only or app-based instruction; and blended learning, which combines the two. A better understanding of how digital skills are currently taught within the education and workforce systems, what digital competencies employers and industry value and how learners build digital skills could lay the foundation for more productive instruction and learning tools. These goals and others can be realized and supported through federal policy, as outlined in the recommendations at the end of this paper.

Just as learners are likely to have gaps in their digital skills between personal and professional contexts, instructors also exhibit fragmented knowledge. This is a particular barrier for instructors without certifications or formal teaching backgrounds, a common occurrence in the adult education field.[23] While not uncommon, instructors' own fragmented knowledge poses an added challenge for learners attempting to increase their digital problem-solving skills if their instructor is similarly grappling with the subject matter.

In the absence of clear best practices for digital instruction, some larger employers are creating their own solutions. For example, when Bridgestone Americas Tire Operations, LLC noticed a gap in knowledge among their retail sales associates, they sought out a digital solution to quickly upskill their workforce. Bridgestone contracted with a technology firm, Designing Digitally, Inc., to create a mobile learning app which featured digital flashcards displaying each product and its specifications to help associates fill their knowledge gap. While the program also functions as a website, Designing Digitally, Inc. prioritized a mobile-based platform to increase accessibility and limit the bandwidth necessary to run the program, ensuring access in rural and remote areas with limited service.

Source: https://elearningindustry.com/mobile-learning-app-maximize-value-case-study

> **Nearly 50 million U.S. workers will need new digital literacy skills if they are going to be able to effectively work with new workplace technologies.**

Industry and sector partnerships bring value to small and mid-sized businesses as well as new and incumbent workers. This resource-sharing model can help incumbent workers access high-quality education and training while simultaneously receiving valuable support services such as childcare, transportation, and career navigation through partnership, ensuring that individuals are able to persist and succeed in their chosen training programs.

Decentralization allows best practices to fall through the cracks

Employers and industry are bellwethers for the oncoming digital transformation of work and the workplace, ushering in new in-house trainings and platforms to retrofit legacy systems to address emerging problems. In the meantime, education and workforce systems are racing to catch up in meeting employer demand for a digitally skilled workforce. Already today, industry demand for a digitally skilled workforce outpaces supply and no sole actor can devise and support the upskilling opportunities that digital disruption is demanding.

Nearly 50 million U.S. workers will need new digital literacy skills if they are going to be able to effectively work with new workplace technologies. To mitigate the cost and magnitude of this task, the core workforce players—including businesses, community-based organizations, training providers, community colleges, workforce development boards, and workers themselves—should align sector-based strategies that allow them to share the burden. These strategies, also called industry and sector partnerships or ISPs, were codified under WIOA as a method to engage the disparate parts of the workforce pipeline in strategic conversation that addresses the needs of all actors.

Over on the West Coast, the California Workforce Development Board designed its sector partnership program, the High Road Training Partnership (HRTP), as a demonstration project to model partnership best practices. The HRTP framework was created to build economic opportunity and mobility, mitigate climate change and engage employers to increase quality jobs throughout the state.

These sector-based and worker-focused partnerships prioritize building skills for California's "high road" employers—those that invest in their workforce and generate family-sustaining jobs and wages. Building Skills Partnership is one such partner, which provides essential training in English language skills and green certification for janitors, often coupled with financial and digital literacy and immigrant integration education resources.

Despite being lauded as an impactful workforce development practice at all levels of government, no federal policy currently provides dedicated funding to support the expanded use of industry and sector partnerships. Combined with the fact that federal workforce policies across the board are significantly underfunded, this lack of targeted resources hinders the widespread scaling of sector

INDUSTRY AND SECTOR PARTNERSHIPS (ISPs)

Industry and sector partnerships (ISPs) are workforce development models that were defined in federal law in 2014 with the passage of the Workforce Innovation and Opportunity Act—a comprehensive policy aimed at modernizing and streamlining federal, state, and local workforce programs. WIOA defines an industry and sector partnership as a workforce collaborative convened by a state or local workforce board that includes representatives of multiple businesses in an industry cluster as well as labor, workforce agencies, educational institutions and community organizations.

partnerships, which will present a challenge to industries impacted by technological and structural changes in the labor market. Congress should consider how all policies that support education and training, including WIOA, the Strengthening Career and Technical Education for the 21st Century Act (also known as Perkins V), and the Higher Education Act (HEA) can be updated to reflect the importance of ISPs.

Business connections to upskilling opportunities are essential, but uneven

Businesses know best what skills and competencies their workers need to succeed on the job. Working adults learn best when foundational skills and technical training are integrated with practical, on-the-job instruction and contexts, a method called contextualized learning.[24] Just so, using digital applications in blended approaches to improve both technical and digital skills is increasingly a fundamental best practice. Engaging and upskilling today's workforce as jobs transform will require direct employer investment in the digital skills, competencies, and training methods that industries endorse for in-demand careers.

However, education and upskilling opportunities often focus on the *incoming* workforce just entering their jobs, and do not include *incumbent* workers, who have equally urgent needs but typically far less access to training, time to devote to upskilling, or opportunity to participate. Several individual employers have successfully piloted digital

skills training programs for incumbent workers,[25] but industry as a whole—and in particular small and mid-sized businesses, where a majority of workers with no digital skills work—will need assistance to meet this challenge.[26] Where very large employers may be able to launch an in-house upskilling initiative entirely on their own, small and mid-sized enterprises (SMEs) typically look to industry associations and chambers of commerce, industry sector partnerships, or qualified intermediary organizations to assist them in developing talent pipeline initiatives.

Additionally, workers with less formal education and training are most in need of employer-sponsored skills investments.[27] Building foundational digital literacy that "undergirds a more digitally resilient workforce capable of adapting and responding to new systems, tools and processes" is a priority for both workers and employers.[28]

Finally, business connections to upskilling opportunities are uneven. Private sector investment in training is heavily weighted towards highly educated workers: Eighty-three percent of employer tuition reimbursement and on-the-job training is dedicated to employees who already hold a bachelor's degree or have at least attended college.[29] That leaves out the two-thirds of the U.S. workforce that does not have or plan to pursue a four-year degree. The private sector's uneven investment in upskilling workers with a high school credential or less further exacerbates gaps in the labor and skills market.

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INTERNET AND DEVICE ACCESS ISSUES

Expanding digital literacy is simultaneously a conversation about extending access to training and access to the tools necessary to succeed in that training. Dependable and affordable home broadband access, personal device access and updated, interoperable software, among other tools are all essential to digital upskilling.

First and most plainly, internet access is essential to digital skills instruction, especially for those learners without mobile access or who lack unlimited mobile data plans. The digital divide between people who have broadband internet access and those who have no access or have cell phone-only access is a huge barrier to accessing education and training opportunities and entering the workforce.[30] Enrollment applications, financial aid applications, work requirements, and job openings are now almost exclusively accessible via the internet, and many sites are not fully accessible to mobile-only users.[31] Additionally, technology access issues like limited connectivity are associated with lower grade point averages for students, especially for students of color or students of lower socioeconomic status.[32]

The expense of broadband internet service and language barriers similarly play a role in the digital divide. Most U.S. adults who do not have broadband at home cite the monthly cost of broadband internet service as a reason for not subscribing.[33] Currently, over twenty million U.S. households (18 percent) have no internet access while another nine million (8 percent) have mobile-only access.[34] The issue of reliable access is compounded in rural America where nearly a third (31 percent) of residents lack fixed and mobile broadband access.[35] Lack of full access to the internet hampers workers' ability to develop digital literacy and access digital learning tools which require high-speed, high-bandwidth connections.

Digital access issues also manifest in education and training spaces. Bring-your-own-device training programs in adult education contexts, which rely on digital learning modules run directly on students' personal devices, often assume adult learners' access to up-to-date mobile or other computing devices. This training model—though it can be highly successful in terms of skill gains—automatically excludes learners with the least access and greatest need. It also assumes that physical access to a mobile device means full access, which, for a variety of reasons (e.g., operating system, age of the device, processing speed, size of data plan or memory capability), is not necessarily the case.

Digital inequities are under a spotlight since the onset of the novel coronavirus pandemic.[36] Covid-19 draws stark lines between the haves and the have-nots as learning institutions and employers roll out distance learning and remote work tools that only the digitally fluent can access. Full and equitable access to robust home broadband and modern digital devices, in addition to the skills to navigate digital interfaces, is imperative for individuals and communities to interact, work, and survive in a post-pandemic society and transition to an equitable recovery.

Multiple state and federal bills address internet access issues, particularly from a rural broadband access lens, but a more complete scope is necessary to address the nuance within accessibility and connectivity. Workers and communities need legislation which authorizes federal funding to expand and extend access to high speed broadband, accessibility tools and tools training, and digital literacy instruction to meet the challenges that Covid-19 poses and the long-term implications of a digitalizing society. Broader takes like the Digital Equity Act, which addresses the issue of digital inclusion[37] and authorizes federal funding to expand and extend access to high speed broadband, accessibility tools and training, digital literacy instruction and additional resources, are more adept at addressing the holistic issues of internet and device access for learners, workers, and instructors alike and are part of the solution to addressing broader access needs.

Shifting to what works

While the labor market ramifications of rapid workplace digitalization and automation are unprecedented, the policies and practices necessary to meet the demands of workers and businesses are well-established.

> **Make a federal commitment to occupational digital literacy and create a new national grant program to administer Digital Literacy Upskilling Grants and expand access to high quality digital skills instruction that meets industry and worker needs**

Preparing learners and employers to be resilient through digital disruptions requires investment in the proven best practices providing competency-based instruction that results in transferable digital problem-solving skills. To support workers and employers, we should invest in developing consumer protection quality standards and safeguards for digital skills instruction. A standardized system will:

1. Ensure that public funds are not spent on unproven digital tools and programs, especially online-only options that lack evidence that they are as effective as blended or in-person programs,[38] and

2. Prioritize those tools and programs which provide learners with the marketable digital skills and proven outcomes they deserve.

Ideally, competency-based instruction provides learners with foundational and transferable digital problem-solving skills that can be built upon with additional industry-specific training. Again, quantifying digital skills *across* industries will require establishing baseline digital competencies that prepare workers for entry-level positions. From there, additional industry-specific competencies and trainings can be identified and scaled. As detailed below, OCTAE and DOLETA will be essential in determining baseline competencies and sector-specific digital competencies with industry representation and input.

Ultimately, meeting business and worker demand for occupational digital literacy and problem-solving skills will require proportionate investment in training and supports for the 48 million American workers with digital skill needs.

Policy recommendations:

- **Congress should build capacity within states to pursue digital inclusion, literacy and problem-solving skill building initiatives through "Digital Literacy Upskilling Grants."** The federal government should allocate funds to states via two types funding—one set of capacity-building formula funding to all states[39] and a competitive grant program to invest in best practices and spur innovation among states. Formula funds should be used to contextualize digital skills instruction, increase instructor professional development, support training costs of incoming and incumbent workers and include a state set-aside to support the development of digital literacy skill gain metrics as part of state postsecondary attainment goals.[40] Professional development should help instructors develop their own skills, learn how they can use tech tools in the classroom to build students' digital literacy, connect digital literacy to employment goals and take advantage of Open Educational Resources to reduce curricula and program costs.

- **Federal and state agencies should better analyze existing datasets** (e.g., WIOA National Reporting System for Adult Education, or NRS) to determine which program characteristics are correlated with favorable outcomes for learners and understand whether existing digital learning methods produce equitable outcomes for learners and how programs might be improved to narrow any equity gaps, including racial equity gaps.

States should also recommend that employer upskilling strategies include meaningful on-ramps to postsecondary attainment for workers who have foundational skills gaps. In an upcoming publication, National Skills Coalition will explore how structural labor market disruptions will put added importance on quality workforce data collection and data disaggregation by race and ethnicity to determine the equity implications of digital disruption.

Develop a national standard for contextualized, industry-specific digital upskilling efforts

Congress should adopt a formal definition of occupational digital literacy, and embed this in workforce and education policy. In particular, the Department of Education should be tasked (and resourced) with ensuring all workers and learners have access to digital literacy skills, with the assistance of the Departments of Labor and Commerce. Federal-level agency guidance and investment (such as through the Digital Upskilling Grants described above) will allow businesses and training providers to align around the best practices for contextualizing digital skills instruction in occupational contexts, rather than creating multiple standalone modules of middling efficacy.

> An overwhelming majority of voters (86 percent) support making it easier for the government and businesses to work together to upgrade all workers' basic digital skills.

Assessing workers' digital skills gaps is a natural component of building workers' and businesses' resilience to technological and structural disruptions in the labor market, including those caused by the Covid-19 pandemic. By creating a formalized digital skills assessment or comparable method of benchmarking digital competencies learned through prior education or experience,[41] advocates can help employers, workers and policymakers align priorities for mutual benefit.

From there, measuring learners' existing digital skills lays the foundation for additional industry-specific upskilling efforts for new and incumbent workers. This will require conducting better analysis of existing data around education and employment outcomes, both through adult education and higher education contexts, to establish a baseline.

Policy recommendations:

- **Congress should call on the Department of Education and Department of Labor to formally adopt a common definition for occupational digital literacy and problem-solving skills.** Congress should also ensure that relevant existing and upcoming legislative text (e.g., WIOA, Higher Education Act, Perkins V and similar) is aligned with these new standards.

- **Congress should charge the Departments of Education and Labor with conducting a national "digital literacy audit"** around education and employment outcomes, to better evaluate what skills workers currently have, assess current and future industry demands for digital skills, and develop a strategy to close the gap. Agency efforts in this audit should focus primarily on developing a strategy to close the gap for individuals who have one or more "barriers to employment" as defined under WIOA. Agencies should explore adding individuals with limited digital literacy and problem-solving skills to that list.[42]

- **Congress should expand and update WIOA Title II to include additional investment in support of digital literacy** as a core component of any adult education program. Congress should also update WIOA Title II performance reporting to include digital literacy and problem-solving skills as a way to demonstrate measurable skill gains by participants. This should be woven into existing performance reporting systems to minimize administrative burden, should be measured using a reputable and validated assessment tool, and should be accompanied by increased investment so as not to serve as an unfunded mandate on providers.

- **Policymakers should research, develop, and invest in a scalable, low-cost digital assessment and aligned learning technologies** in partnership with local employers to empower them to assess the foundational competencies of their incumbent workforce.

Nine out of ten (90 percent) voters and three-quarters (74 percent) of businesses support targeted tax incentives for businesses that invest in skills training.

Create a network of "21st Century Industry Partnerships" between businesses, education providers, the public workforce system, and community organizations

In this new age of digitalization and workplace automation, every industry is adopting new technologies to keep pace, though the burden of modernization is falling hardest on small- and medium-sized businesses.[43] Sector partnerships will ensure the significant public and private investments necessary to respond to digital upskilling needs caused by technological changes in the workplace align with employment opportunities in in-demand industries. By helping businesses work together with education and training providers, these partnerships can ensure industry-driven solutions that provide workers with access to in-demand industry skills.

Investments in sector partnerships and other opportunities to braid funding can be kickstarted by incorporating digital literacy investments into broader state postsecondary attainment goals and strategies. These goals are typically established by the governor or state higher education officials in recognition of the increasing importance of postsecondary credentials in the modern workforce. Goals often set an ambitious target, such as: 60 percent of the working-age population will have a post-

secondary credential by 2030. More than 40 states have set such goals to date. States increasingly recognize that blended learning (which combines in-person and online learning) will be an important tool in helping working adults complete postsecondary credentials, but adults need digital skills in order to be able to take advantage of blended learning opportunities.

Policy recommendations:

- **Congress should invest in partnerships between industry and education providers** to inform education providers of employer needs, scale employer-based upskilling best practices, and better address worker and employer labor market needs at the local and regional level.

- **Congress should expand investment in the Higher Education Act and in Perkins V**, including additional technical assistance as necessary, to expand access to blended learning opportunities and proven digital skills training models in community college settings.

- **State policymakers should create or revise state strategic plans** to include digital literacy goals that align with their governor's postsecondary credentialing campaign or other educational attainment taskforce strategies and metrics.

Incentivize private investment in digital skills training, instruction and upskilling opportunities for incumbent workers by expanding the scope of existing tax policies

Private investment plays an important role in helping incumbent workers upskill. Employers large and small—from the multi-state behemoth Tyson Foods to the smaller Eat 'n' Park Restaurants in Homestead, PA—have already incorporated digital literacy and problem-solving training into their frontline employee upskilling programs to mutual employer and employee benefit.[44]

While the business case for investing in the skills of incumbent workers is well-documented, employers—especially small and medium-sized businesses with smaller margins and less ability to absorb risk—may need support to upskill their new and incumbent workforces. Tax credits such as the Workforce Opportunity Tax Credit already help drive private investments in recruitment, though digital disruptions necessitate more robust incentives aimed specifically at work-based learning and digital upskilling for incumbent workers. A set-aside could help target incentives for small and mid-sized employers and those engaging in quality digital skills work-based learning programs for incumbent workers over other eligible costs.

Policy recommendations:

- To underscore employers' role and value in upskilling efforts, **Congress should restructure the $1 billion Work Opportunity Tax Credit as the Work-Based Learning Opportunity Tax Credit.** This program would reward companies that hire people with low basic skills, including foundational digital skills, via a tax credit that partially offsets costs incurred by businesses. Eligible costs would be those incurred by companies that invest in on-site training or pay the tuition of such employees who are learning off-site at a community college or other training institution, who are pursuing that training as part of an apprenticeship or other formalized work-based learning program.[45]

- **State policymakers should allocate rapid response funds to support industry partnerships** and assist disconnected workers during their transition to new employment. Some states already do this; expanding this practice would ensure workers in every state are better connected to employers and training for in-demand occupations. Using a portion of these state Department of Labor funds to enroll individuals in digital skills training would improve their employability and potential reconnection to work.

- **Policymakers should identify ways to extend the impact of private investment in the incumbent workforce** by incentivizing alignment with public funding streams like SNAP Employment and Training, Temporary Assistance for Needy Families, state incumbent worker training funds, and other similar funds with shared outcomes. Coupling digital literacy instruction with existing English language learner training is already a best practice as it helps maximize investments and drive efficiency.[46]

Conclusion

Policymakers, business leaders, and workforce advocates can use the information and recommendations provided in this brief to inform their efforts to upskill America's workers and equip employers with the skilled workforce they need.

Inequitable digital skills and access already threatened the longevity of whole swaths of workers in their career of choice, even before Covid-19 emerged to compound these challenges. For workers of color, immigrant workers, and workers with limited formal education, digital skill gaps present immediate threats to their ability to weather digital disruptions in the workplace and make them significantly less likely to reconnect to work once separated. Failing to act now to break down digital barriers will continue to leave whole communities on the sidelines of essential public forums.

Individuals and communities need state and federal policymakers to commit to creating digitally equitable systems in response to the crisis and beyond. As workers, training providers, and businesses in sectors like healthcare, logistics, and infrastructure scurry to keep essential services flowing, policymakers must return the favor by advancing and investing in the policy mechanisms that will enable those essential workers to learn and engage with the digital tools needed to thrive in our complex and fast-changing economy.

Endnotes

1   More data on US workers' digital skill gaps is available in "The New Landscape of Digital Literacy," National Skills Coalition, 2020, https://www.nationalskillscoalition.org/resources/publications/file/New-Digital-Landscape-web.pdf

2   For more on racial inequities in digital skills and potential solutions, see "Applying a Racial Equity Lens to Digital Literacy," National Skills Coalition, 2020, https://www.nationalskillscoalition.org/resources/publications/file/Digital-Skills-Racial-Equity-Final.pdf

3   James Manyika, "Technology, jobs, and the future of work," McKinsey Global Institute, May 2017, https://www.mckinsey.com/featured-insights/employment-and-growth/technology-jobs-and-the-future-of-work.

4   Susan Land, et al., The future of work in America: People and places, today and tomorrow, McKinsey Global Institute, July 2019, https://www.mckinsey.com/~/media/McKinsey/Featured%20Insights/Future%20of%20Organizations/The%20future%20of%20work%20in%20America%20People%20and%20places%20today%20and%20tomorrow/The-Future-of-Work-in-America-Full-Report.ashx.

5   Amanda Bergson-Shilcock, "Foundational Skills in the Service Sector," National Skills Coalition, February 2017, https://www.nationalskillscoalition.org/resources/publications/file/NSC-foundational-skills-FINAL.pdf, and "Applying a Racial Equity Lens to Digital Literacy," National Skills Coalition, 2020, https://www.nationalskillscoalition.org/resources/publications/file/Digital-Skills-Racial-Equity-Final.pdf

6   Jobs across the United States increasingly require digital literacy skills. This is true not only for workers in the information technology field or those with college degrees; even entry-level workers in agriculture, healthcare and hospitality are now required to effectively use technology to do their jobs. For example, Kentucky Fried Chicken now trains workers on food safety using virtual reality goggles, while Taylor Farms is training human workers to collaborate with robots in packing vegetables. Maggie Hennessy, "Virtual Reality: Your Restaurant's Next Favorite Tool," QSR Magazine, April 2018, https://www.qsrmagazine.com/technology/virtual-reality-your-restaurants-next-favorite-tool; and Marnette Federis, "How immigrant workers are preparing for automation in agriculture," Public Radio International, October 17, 2019, https://www.pri.org/stories/2019-10-17/how-immigrant-workers-are-preparing-automation-agriculture.

7   An additional 35 percent have achieved a certain level of proficiency in their digital skills, and the final 33 percent of workers have advanced skills. NSC Analysis of OECD Survey of Adult Skills (PIAAC), 2012-2014 and U.S. Census Bureau American Community Survey data.

8   While this data does not break out individuals' digital skills based on their income level, it is worthwhile to note that lower-income Americans have lower levels of technology adoption overall, including home broadband internet and smartphone use, and this gap can limit their ability to build digital skills, use distance learning technologies and adapt to work-from-home requirements. Monica Anderson and Madhumitha Kumar, "Digital divide persists even as lower-income Americans make gains in tech adoption," Pew Research Center, May 7, 2019, https://www.pewresearch.org/fact-tank/2019/05/07/digital-divide-persists-even-as-lower-income-americans-make-gains-in-tech-adoption/.

9   Among workers with no digital skills, 38 percent are employed in positions that require moderate or complex computer skills the remainder require only straightforward computer skills for their current job. Among workers with limited digital skills, 43 percent require moderate or complex computer skills to perform in their current job. See: "The New Landscape of Digital Literacy," National Skills Coalition, 2020, https://www.nationalskillscoalition.org/resources/publications/file/New-Digital-Landscape-web.pdf

10 One-fifth (20 percent) of workers with no digital skills are supervising other employees while one-third (33 percent) of workers with limited digital skills are supervisors. "The New Landscape of Digital Literacy," National Skills Coalition, 2020.

11 Ibid.

12 Dr. Ismail White and Harin Contractor, Racial Differences on the Future of Work: A Survey of the American Workforce, Joint Center for Political and Economic Studies, July 24, 2019, https://jointcenter.org/wp-content/uploads/2019/09/Joint-Center-Racial-Differences-on-the-Future-of-Work-A-Survey-of-the-American-Workforce_0.pdf

13 "New NSC Analysis Finds Significant Digital Skills Gaps for Workers Across Industries, With Workers of Color Most Likely to Have Limited or No Digital Skills," National Skills Coalition, April 21, 2020, https://www.nationalskillscoalition.org/news/press-releases/new-nsc-analysis-finds-significant-digital-skills-gaps-for-workers-across-industries-with-workers-of-color-most-likely-to-have-limited-or-no-digital-skills

14 https://www.urban.org/sites/default/files/publication/100843/foundational_digital_skills_for_career_progress_2.pdf

15 New NSC Analysis Finds Significant Digital Skills Gaps for Workers Across Industries, With Workers of Color Most Likely to Have Limited or No Digital Skills," National Skills Coalition, April 21, 2020, https://www.nationalskillscoalition.org/news/press-releases/new-nsc-analysis-finds-significant-digital-skills-gaps-for-workers-across-industries-with-workers-of-color-most-likely-to-have-limited-or-no-digital-skills

16 https://www.health.harvard.edu/blog/can-telehealth-help-flatten-the-curve-of-covid-19-2020032419288

17 Educational Testing Service analysis of OECD Survey of Adult Skills (PIAAC), 2012-14, http://www.ets.org/s/research/30079/millennials.html.

18 "The New Landscape of Digital Literacy," National Skills Coalition, 2020, https://www.nationalskillscoalition.org/resources/publications/file/New-Digital-Landscape-web.pdf

19 Programs that reference and integrate digital literacy into workforce contexts are more common at the state level. In Washington state, for example, advocates have leveraged policy to develop the Integrated Digital English Acceleration (I-DEA) program that supports digital literacy for English language learners in the context of college and careers. See more: https://www.sbctc.edu/colleges-staff/programs-services/i-dea/default.aspx.

20   The term "workforce preparation activities" means activities, programs or services designed to help an individual acquire a combination of basic academic skills, critical thinking skills, digital literacy skills, and self-management skills, including competencies in utilizing resources, using information, working with others, understanding systems, and obtaining skills necessary for successful transition into and completion of postsecondary education or training, or employment. PUBLIC LAW 113–128—JULY 22, 2014.

21 WIOA references the Museum and Library Services Act of 2010, which defines digital literacy as "the skills associated with using technology to enable users to find, evaluate, organize, create, and communicate information." PUBLIC LAW 111–340—DEC. 22, 2010.

22 While there is no single "gold standard" digital literacy assessment at the federal level, some states have chosen to integrate a single assessment into their adult education curricula. In Minnesota and Alabama, for example, the Northstar Digital Literacy Assessment is embedded into their on-ramps to career pathways and Ready to Work program, respectively, as a confirmation of measurable digital literacy skill gain. Tom Cytron-Hysom, "Leveraging Digital Literacy Skill Attainment as a Program Outcome," EdTech Center @ World Education, July 25, 2019, https://edtech.worlded.org/leveraging-digital-literacy-skill-attainment-as-a-program-outcome/.

23 The adult education workforce is overwhelmingly part time. Of the 47,602 non-volunteer instructors currently working in WIOA-funded adult education programs in the United States, 37,304 (78 percent) are working part-time and 19,970 (42 percent) have less than three years of experience. Work experience in excess of three years is more common among full-time adult educators (73 percent) than part time educators (54 percent). Office of Career, Technical, and Adult Education National Reporting System, Table 7: Adult Education Personnel by Function and Job Status, 2018-2019 Program Year, https://wdcrobcolp01.ed.gov/CFAPPS/OVAE/NRS/main.cfm.

24 This method is also sometimes referred to as Integrated Education and Training or IET. In an IET model, participants receive simultaneous instruction in foundational skills such as math, reading, digital literacy or spoken English, as well as training for a specific occupation or industry. Amanda Bergson-Shilcock, *Integrated Education and Training Policy Toolkit,* National Skills Coalition, October 2016, https://www.nationalskillscoalition.org/resources/publications/file/Integrated-Education-and-Training-Policy-Toolkit.pdf.

25 Several large employers have found success piloting digital skills training and digital applications for work-based learning. For example, the American food company Chobani launched an on-site digital English language program to improve English language literacy on the production floor of its New Berlin, NY manufacturing facility. Mary Jo Ferrare, "Chobani's 'Voxy' Pilot Holds Promise for ESL Learners," Workforce Development Institute, June 5, 2019, https://wdiny.org/OurNewsAndViews/Chobani-s--Voxy--Pilot-Holds-Promise-for-ESL-Learners.

26 A majority of workers with no digital skills are employed in small businesses while workers with limited digital skills are also slightly overrepresented in SMEs. NSC analysis of OECD Survey of Adult Skills (PIAAC), 2012-2014.

27 Andy Van Kleunen, et al., "An Unequal Future of Work Requires Different Training Strategies for Vulnerable Workers" *Taking Action: Positioning Low-Income Workers to Succeed in a Changing Economy,* Annie E. Casey Foundation and Joyce Foundation, 2019, https://www.aecf.org/m/resourcedoc/hatcher-takingaction-2019.pdf#page=18.

28 Rework America Business Network, *Digital Blindspot: How Digital Literacy Can Create a More Resilient American Workforce*, A Markle Initiative, October 2019, https://www.markle.org/sites/default/files/2019-10-24-RABN-Digital-Literacy-ReportFINAL.pdf.

29 Anthony P. Carnevale, Jeff Strohl and Artem Gulish, *College Is Just the Beginning: Employers' Role in the $1.1 Trillion Postsecondary Education and Training System,* Georgetown University Center on Education and the Workforce, February 2015, https://cew.georgetown.edu/wp-content/uploads/2015/02/Trillion-Dollar-Training-System-.pdf#page=7.

30 Monica Anderson, "Mobile Technology and Home Broadband 2019," Pew Research Center, June 13, 2019, https://www.pewresearch.org/internet/2019/06/13/mobile-technology-and-home-broadband-2019/.

31 Aaron Smith, "Searching for Work in the Digital Era," Pew Research Center, November 19, 2016, http://www.pewinternet.org/2015/11/19/searching-for-work-in-the-digital-era/.

32 Gonzales, A. L.., McCrory Calarco, J., & Lynch, T., "Technology Problems and Student Achievement Gaps: A Validation and Extension of the Technology Maintenance Construct," Communication Research, August 2018, https://doi.org/10.1177/0093650218796366.

33 Andrew Perrin, "Smartphones help Blacks, Hispanics bridge some—but not all—digital gaps with whites," Pew Research Center, August 31, 2017, http://www.pewresearch.org/fact-tank/2017/08/31/smartphones-help-blacks-hispanics-bridge-some-but-not-all-digital-gaps-with-whites/.

34 NSC analysis of U.S. Census Bureau, 2013-2017 American Community Survey 5-Year Estimates.

35 In rural areas, just 69 percent of residents have access to both fixed broadband and mobile broadband connections, compared to 98 percent of Americans residing in urban areas. Federal Communications Commission, "2018 Broadband Deployment Report," February 2, 2018, https://www.fcc.gov/reports-research/reports/broadband-progress-reports/2018-broadband-deployment-report.

36 "COVID-19 shines a spotlight on digital skills: Updates and key questions for advocates and policymakers," National Skills Coalition, April 21, 2020, https://www.nationalskillscoalition.org/news/blog/covid-19-shines-a-spotlight-on-digital-skills-updates-and-key-questions-for-advocates-and-policymakers

37 The Digital Equity Act uses the NDIA-provided definitions for "digital inclusion" and "digital equity." Digital Inclusion is defined as "the activities necessary to ensure that all individuals and communities, including the most disadvantaged, have access to and use of Information and Communication Technologies. This includes 5 elements: 1) affordable, robust broadband internet service; 2) internet-enabled devices that meet the needs of the user; 3) access to digital literacy training; 4) quality technical support; and 5) applications and online content designed to enable and encourage self-sufficiency, participation and collaboration." National Digital Inclusion Alliance, Definitions, no date, https://www.digitalinclusion.org/definitions/.

38 Jeff Carter, "Expanding Access to Learning with Mobile Digital Devices," *Journal of Research and Practice for Adult Literacy, Secondary and Basic Education*, Forum: Technology, Access and Adult Learning, Vol. 6, No. 2, Summer 2017, https://files.constantcontact.com/94655a8e201/6b68a99a-72c5-4e2c-9ca2-3026e85d21aa.pdf.

39 Digital literacy investments could also be bolstered through other key federal workforce and education policies, such as the Higher Education Act, Perkins Career and Technical Education Act, or Supplemental Nutrition Assistance Program Employment and Training (SNAP E&T).

40 Many states have more available jobs than they have workers pursuing the postsecondary credentials necessary to fill these openings. To bridge this gap, many states have established statewide postsecondary attainment goals, backed by regional partnerships and state funding investments, to boost the number of adults pursuing postsecondary credentials and meet employer demand. Jenna Leventoff, "Counting Registered Apprenticeship Completions," National Skills Coalition, November 2018, https://www.nationalskillscoalition.org/resources/publications/file/Counting-Registered-Apprenticeship-Completions.pdf. Currently, 42 states have set quantifiable postsecondary attainment goals. See more: http://strongernation.luminafoundation.org/report/2020/#nation.

41 Prior learning assessments like Literacy Minnesota's Northstar Digital Learning Assessment give credit for the digital competencies which learners have already mastered while noting those areas where learners would benefit from additional instruction. Northstar Digital Literacy, "About the Assessments," Literacy Minnesota, no date, https://www.digitalliteracyassessment.org/assessment-info#about-the-assessments.

42 Currently, the list includes 13 elements, including low levels of English literacy as an example of a barrier to employment, but does not mention the lack of other foundational skills as a barrier. We suggest that in a digitalizing economy and in light of rapid changes spurred by the COVID-19 pandemic, a lack of digital literacy or problem-solving skills is a serious barrier to employment for jobseekers across sectors and should be referenced as such in WIOA. WIOA Barriers to Employment – Common Elements Core Partners, https://educateiowa.gov/sites/files/ed/documents/WIOA%20Barriers%20to%20Employment%20-%20Definitions.pdf.

43 Larger national companies are more able to support the cost of in-house training and upskilling programs. For example, Nationwide insurance announced in January 2020 its plans for a $160 million investment over five years in digital literacy and "future capabilities" training for its 28,000 U.S. employees. Ryan Golden, "Nationwide announces $160M employee digital literacy training," HR Dive, January 21, 2020, https://www.hrdive.com/news/nationwide-announces-160m-employee-digital-literacy-training/570786/.

44 Tyson Foods, "Tyson Foods' Workforce Education Initiative Continues to Expand: Upward Academy Surpasses 100,000 Instructional Hours," Press Release, April 19, 2018, https://www.tysonfoods.com/news/news-releases/2018/4/tyson-foods-workforce-education-initiative-continues-expand; and Vivian Vázquez, Jenny Weissbourd and Amy Blair, *Harnessing Digital Technology for Frontline Worker Mobility: Eat'n Park's Partnered Approach*, The Aspen Institute Workforce Strategies Initiative, August 2019, https://assets.aspeninstitute.org/content/uploads/2019/08/Harnessing-Digital-Technology-for-Frontline-Worker-Mobility.pdf?_ga=2.116595782.1719731590.1566233463-1581268523.1563203196.

45 Ibid. *Foundational Skills in the Service Sector.*

46 For more on this issue, see *Amplifying Impact,* National Skills Coalition, June 2020, https://www.nationalskillscoalition.org/news/blog/amplifying-impact-why-policies-that-combine-investments-in-english-language-and-digital-literacy-are-vital

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