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Advancing Workforce Integration Through Digital Literacy for English Language Learners

Prepared for
The International Rescue Committee

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Foreword

Students at the Robert M. La Follette School of Public Affairs at the University of Wisconsin–Madison prepared this report for the International Rescue Committee (IRC). This project provides graduate students the opportunity to improve their skills while providing the client with an analysis of a policy problem to help guide decisions.

The La Follette School offers a two-year graduate program leading to a Master of Public Affairs (MPA) or a Master of International Public Affairs (MIPA) degree. Students develop quantitative skills and experience in program evaluation to gain expertise in analyzing public policies. The Workshop in International Public Affairs gives graduate students an opportunity to produce a report for a real-world client about a question of importance to that organization.

This report represents the efforts of graduate students in our public policy program to address a policy challenge defined and framed by the IRC. The students have used their training in policy analysis to provide insights and recommendations based on data and information available to them. It is important to recognize that the students are not experts in the specific subject matter of this project. As such, there may be limitations in the students' ability to capture all legal, technical, or contextual nuances.

We thank the IRC for partnering with the La Follette School on this project. The IRC staff members have been generous with their time to support the students' work. The students have collectively contributed hundreds of hours to the project and developed critical insights about digital skills gaps for workforce integration in the English Language Learner population. The La Follette School is grateful for this collaborative effort and hopes the report proves valuable. The findings and recommendations in this report are intended to contribute to the ongoing discussion and development of effective public policy solutions.

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The views, opinions, and recommendations in this report represent those of the authors alone and do not reflect the findings, recommendations, or policies of the University of Wisconsin–Madison, the La Follette School, or the International Rescue Committee.

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Abbreviations

AI	Artificial Intelligence
ELL	English Language Learner
ISCED	International Standard Classification of Education
NDIA	National Digital Inclusion Alliance
NTIA	National Telecommunications and Information Administration
OLS	Ordinary Least Squares

Executive Summary

As technology continues to shape the workforce, digital skills have become fundamental for employment. English Language Learners (ELLs) represent a growing portion of the workforce and often face compounding barriers to acquiring digital skills. These challenges limit employment and career advancement opportunities, especially given that entry-level jobs increasingly require some digital skills. This report, prepared by the La Follette School of Public Affairs for the International Rescue Committee (IRC), examines digital skill gaps among ELLs and proposes actionable recommendations for collective action among employers, policymakers, and partners to improve workforce readiness for ELLs.

Drawing on survey data from the IRC's ELL clients and a nationally representative sample from the U.S National Telecommunications and Information Administration, this report uses probability and regression analysis to examine the relationship between demographic characteristics, technology access, and digital skills. The findings indicate that, on average, respondents report low confidence across key workforce-related digital skills. ELLs also face more limited access to the internet and devices other than a smartphone, further constraining opportunities to improve digital skills. These gaps are especially acute in comparison to national trends, which indicate that Americans are more than 50 percent likely to have workforce-related digital skills.

The analysis identified several key risk factors that are associated with these disparities, including lower educational level, limited English proficiency, and lack of access to reliable internet and a device other than a phone. Extensions of this analysis also underscore the importance of geography and socioeconomic status in shaping digital skills levels. These findings have significant implications for workforce outcomes, as ELLs often remain in jobs that require a low level of digital literacy and often provide lower wages, less stability, and fewer opportunities for career advancement.

Based on our findings, we propose eight recommendations across two key categories, programming and enabling environment:

Programming

1.1) Focus digital skills programming on developing digital literacy, not just individual skills.

1.2) Align digital skills programming with workforce trends and needs.

1.3) Integrate digital skills programming with other relevant services.

1.4) Implement monitoring and evaluation processes to strengthen digital skills programming.

Enabling Environment

2.1) Expand device and internet access to support digital skills development among ELLs.

2.2) Strengthen data collection on advanced digital skills and employer demand.

2.3) Prioritize a place-based approach to digital skills and workforce programming.

2.4) Support educational pathways and advanced digital skills development.

Concurrent efforts to strengthen digital skills programming for ELLs and the broader enabling environment can help employers access a wider range of employees and provide employment opportunities to ELLs, a traditionally vulnerable population that faces compounding barriers to workforce integration. The pace of digitalization in the workforce suggests that generalized confidence in a wide range of advanced digital skills will be essential for successful integration and career advancement in the U.S. workforce. Employers, policymakers, and partners must therefore support ELLs in developing digital literacy to adapt and thrive in the face of future shifts in the workforce.

Introduction

English Language Learners (ELLs) make up a growing share of the workforce in many communities across the country. However, according to the Program for the International Assessment of Adult Competencies, 40 percent of workers with limited English language proficiency lack digital skills entirely (National Skills Coalition, 2020). As technology is increasingly incorporated in workplaces across industries, digital skills are becoming necessary for even entry level positions, creating a barrier for ELLs that lack confidence or ability in this area. One ELL that participated in digital skills programming said, **"The best way to adapt to a new country is to know the language [...] But digital literacy is just as important — they complete one another"** (IRC, 2025). Identifying where digital skills gaps exist among this population is an important step in designing programs and policies that better support workforce readiness.

Given the rapid pace of technological change, digital skills programming for workforce readiness must look beyond developing skill-specific abilities to equip individuals with digital literacy more broadly. Generalized confidence with digital skills that align with workforce needs can better prepare individuals to learn future skills. Stronger digital literacy will help reduce barriers to employment and career advancement for ELLs, who often face multiple compounding barriers to workforce integration.

ELLs face unique social, political, and economic challenges when integrating into the U.S. workforce. Various organizations provide social and legal services to address these barriers, including digital skills gaps. **This report aims to analyze potential digital skills gaps among ELLs and, using the findings, develop actionable recommendations for collective action between employers, policymakers, and partners seeking to improve workforce readiness.**

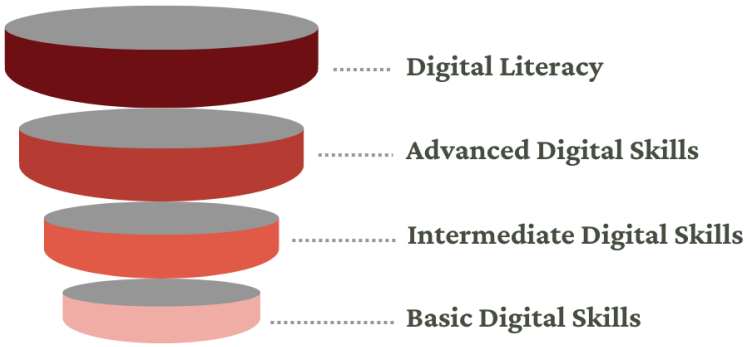
In this report, we utilize survey data collected by the International Rescue Committee (IRC) from its ELL clients to analyze technology access and digital skills gaps among ELLs. We employ probability and regression analysis to examine the associations between client characteristics and measures of technology access and digital skills. We look to the literature to identify potential gaps between the digital skills among ELLs and the digital skills needed for workforce integration. We also compare the IRC survey data to a nationally representative sample to consider how to best tailor digital skills programming to the unique needs of ELLs. Based on our analysis, we propose eight recommendations organized into two categories — digital skills programming and the broader enabling environment — for policymakers, employers, and digital skills training providers to address the digital skills gap and advance workforce integration for ELLs. Addressing the digital skills gap can help employers access a wider range of employees and provide employment opportunities to a traditionally vulnerable population.

Background

Digital Skills & Digital Literacy in the Workforce

Digital skills encompass the abilities necessary for using technology in everyday life and work activities (Hecker & Loprest, 2019). In this case, digital skills are foundational tools rather than specialized knowledge for technical roles like software-engineering or information technology. These digital skills can be understood as a continuum from basic to advanced skills. Basic digital skills can range from operating a computer or smartphone to using a mouse to navigating a webpage. Intermediate skills involve completing specific tasks, such as sending emails, searching for information online, or creating a resume. More advanced digital skills refer to an individual's ability to use digital knowledge in a new context. With respect to the workforce, a digital skills gap occurs when there is a gap between the digital skills needed by businesses and organizations, and the skills possessed by the workforce (Barbara, 2025).

Figure 1: From Digital Skills to Digital Literacy



Individuals who are able to apply digital knowledge and problem solving to new platforms and uses are considered digitally literate (Hecker & Loprest, 2019). Digital literacy is "the ability to access, manage, understand, integrate, communicate, evaluate, and create information safely and appropriately through digital devices and networked technologies" (UNHCR, 2025). Digital literacy looks beyond specific digital skills to capture individuals' broader fluency using technology to navigate, consume, and produce information. These distinctions are especially important in the context of workforce integration, where the ability to effectively use technology is more critical than ever. As research increases, the field is heading toward digital resilience to underscore the importance of a resilient mindset in the face of fast-changing technology. Digital resilience refers to the awareness, skills, agility, and confidence to be empowered users of technology and adapt to changing digital skill demands encompassing transferable skills, self-efficacy, and a flexible mindset (Tucker, 2024). Digital resilience is emerging as an important goal. However, our research centers on ELLs' digital skills gaps and draws on data about their confidence in specific tasks because resilience encompasses a broader set of behaviors not captured in our dataset. We therefore treat strengthening digital literacy as a necessary first step and the focus of this report.

Across all sectors of the U.S. labor market, digital skills have become a baseline requirement for employment. The growing demand for digital skills in the workforce can be attributed to digitalization: the spread of technologies into every workplace, business, and pocket. Analysis of the digital content of 545 occupations representing approximately 90 percent of the U.S. workforce across industries between 2002 and 2016 demonstrates that digitalization is occurring rapidly across industries (Muro et al., 2017). Overall, digitalization scores, representing the degree of digital skill intensity for each job, rose in 95 percent (517 of 545) of the analyzed occupations. More specifically, demand is accelerating for highly digital skill-intensive occupations. Between 2002 and 2016, the share

of all jobs requiring a high intensity of digital skills more than quadrupled, from five to 23 percent, whereas the share of jobs requiring low digital skills dropped from 56 to 30 percent. Even occupations with historically low digital content have experienced substantial digital expansion by using technologies such as basic enterprise management software or spreadsheets.

Beyond the general upward trend, digitalization is also occurring unevenly across industries. For instance, the proportion of oilfield or rig worker jobs that required digital skills grew from 15 percent in 2019 to 38 percent by 2021 (Bergson-Shilcock & Taylor, 2023). Other jobs exhibiting above average growth rates in the demand for digital skills include diesel mechanic, community health worker, tool maker, and asset protection specialist.

While workers often fear being replaced by technology, research suggests that digitalization primarily changes the nature of job tasks rather than eliminating entire occupations (Autor, 2015; Muro et al., 2017). This transformation across all positions increases the importance of digital competencies, including for workers in low digital skill-intensive positions. As of 2023, 92 percent of job ads analyzed definitely or likely required digital skills (Bergson-Shilcock & Taylor, 2023). The digitalization trend makes digital training urgent for economic integration to avoid unemployment and long-term economic consequences such as diminished career mobility, lower lifetime earnings, increased sensitivity to income shocks, and delayed retirement–among those with lower levels of digital skills. Although transitioning from low to intermediate digital skills levels is a reasonable target for digital skills programming, digitalization appears to impact positions in the medium skill-intensive level category unequally. Indeed, the literature suggests that routine cognitive or manual tasks that follow explicit rules are at the highest risk of replacement by automation, whereas digitalization serves as a complement for workers engaged in non-routine problem-solving and communication (Acemoglu & Autor, 2011; Muro et al., 2017). As a result, digitalization has reduced demand for many medium skill-intensive jobs built around routine tasks such as clerks, administrative assistants, or bookkeepers. This dynamic has contributed to the phenomenon referred to as “job polarization”: employment growth is concentrated in high digital skill positions as well as direct service jobs (Acemoglu & Autor, 2011).

Further, generic digital skills alone may not be sufficient. Broader analysis of the U.S. workforce identified that 92 percent of all jobs requiring zero to two years of experience required an industry-specific digital skill (Bergson-Shilcock & Taylor, 2023). These industry-specific skills can include bookkeepers using QuickBooks, manufacturing workers using AutoCAD, or home health aides using electronic medical records, for example.

As the workforce and everyday life become increasingly digital, digital literacy equips individuals with a baseline competency needed to navigate technology confidently and independently. With digital literacy, unfamiliar tools or platforms become manageable, allowing individuals to build on existing knowledge and effectively engage with new digital demands with a problem-solving mindset. Therefore, efforts to advance workforce integration for ELLs must move beyond developing specific digital skills and aim to advance clients to digital literacy and prevent digital skill gaps from growing.

Risk Factors for Digital Skill Gaps

Key risk factors can exacerbate digital skills gaps. In this report, we build on existing literature and identify nine risk factors for digital skills gaps that we later test in our analysis.

ELLs represent one population that has historically experienced lower rates of computer and internet use, as identified in the Digital Equity Act of 2021 (U.S. Census Bureau, 2024). Low digital literacy is more common among people whose first language is not English, and effective approaches to teaching digital skills must address the language barrier and particular challenges that ELLs face in enhancing their digital skills (Bernstein & Vilter, 2018; Mikelson, Kuehn, & Martin-Caughey, 2017). Lower English proficiency is well-established as a risk factor, but there is a lack of literature examining the particular digital skills gaps among ELLs and relative importance of other potentially compounding risk factors. This report aims to contribute to filling this gap.

The Digital Equity Act identifies five other risk factors for low digital literacy that also apply to ELLs: people 60 years of age and older, individuals with low literacy, rural residents, individuals living in households with incomes not exceeding 150 percent of the poverty level, and members of a racial or ethnic minority group. The other vulnerable populations include incarcerated individuals, veterans, and people with disabilities, but we exclude these factors from this research because the IRC's survey did not collect data on these characteristics, and analysis of these populations is outside of the scope of this research. Previous studies reinforce the Digital Equity Act's classification of populations with lower digital literacy, finding limited internet access and more pronounced digital skills gaps in nonwhite, older, less educated, and less affluent people, as well as those who live in rural areas (Bernstein & Vilter, 2018; Council of Economic Advisers, 2015; Hecker & Loprest, 2019; Hecker, Spaulding, & Kuehn, 2021; Muro et al., 2017; US Department of Commerce, 2013; Zickuhr & Smith, 2013). The Program for the International Assessment of Adult Competencies has repeatedly confirmed these characteristics as risk factors, finding higher rates of adults reporting having "no digital skills" among people who are Black, Hispanic, born outside the United States, older, and have less than high school level education (Mamedova & Pawlowski, 2018; Pawlowski, 2024). These risk factors are particularly relevant to ELLs, who often experience multiple overlapping barriers.

Looking beyond the Digital Equity Act, additional disparities shape digital skills gaps, including among ELLs. Technology access represents the seventh risk factor that can drive digital skills gaps among ELLs. Limited access to devices other than smartphones may increase the risk of digital skills gaps, as many tasks are difficult to perform on mobile devices alone (National Governors Association, 2022; Signé, 2023; Tully, 2025). Limited internet access compounds this barrier. Among individuals who speak a language other than English at home and speak English "less than well," rates of home broadband access are significantly lower. In 2019, 38.7 percent of individuals with limited English proficiency lacked high-speed internet at home, representing nearly 4.8 million people (American Immigration Council, 2022).

Gender and geography represent the eighth and ninth risk factors examined in this analysis. Previous studies have identified gender disparities in digital skills, and initiatives have targeted digital skills as a key driver for women's inclusion in the workforce (Feijao et al., 2021; Martinez-Catos, 2017; Tully, 2025). Additionally, past studies have identified geographical disparities in digital skills, even when controlling for other demographic characteristics (Bergson-Shilcock & Taylor, 2023; Hecker & Loprest, 2019). As a result, job prospects for ELLs may vary based on the local labor markets and workforce development offices they rely on.

ELLs in a Digitalized Workforce

Digital skill disparities manifest in distinct ways for ELLs in the labor market. While digitalization varies across industries, it has especially changed access to work and created new inequalities in industries where ELLs have historically been placed. Currently, a larger share of foreign-born workers is in low digital skilled jobs (Bernstein & Vilter, 2018). Additionally, employment placement data from the IRC suggests a historical concentration of ELLs in low digital skill positions (IRC, 2026b). The main hiring industries of ELLs are retail and trade (e.g. Macy's, Goodwill), accommodation and food services, and transportation and warehousing. Leading companies include Amazon, Uber, Doordash, Marriott International, or Walmart with positions such as package handling, housekeeping, cashier, or driver.

Without digital literacy, ELLs hit limits in their career advancement. More than 95 percent of job ads in retail trade and 85 percent in accommodation and food services now require at least some digital capability (Bergson-Shilcock & Taylor, 2023). Advancing beyond entry-level roles often requires more than basic skills like email or data entry: it increasingly demands industry-specific expertise, which is now required by 43 percent of jobs that only ask for a high school diploma (Hecker & Loprest, 2019). ELLs may become proficient in a single repetitive digital task, such as using a grocery scanner, but lack the skills to transfer that knowledge to higher-paying administrative or supervisory roles. A lack of digital skills also creates a significant barrier to the very programs intended to help.

Indeed, many workforce development intake assessments and high school equivalency tests have moved online, thus barring those with the greatest need from the tools required to progress beyond low-wage cycles (Hecker & Loprest, 2019).

Additionally, remote work has expanded significantly since the COVID-19 pandemic but benefits more digital skill-intensive positions most. Remote work offers greater flexibility and reduces commuting time and costs. However, this shift has been uneven: while approximately 27 percent of medium digital skill occupations can be performed remotely, only 0.3 percent of low digital skill jobs offered remote work options in 2020 (Liu & Muro, 2023). As a result, many ELL workers have largely been excluded from these opportunities and instead turn to the gig economy — freelance or independent work through platforms connecting workers and customers directly for short-term services — to access the flexibility and convenience associated with "on-demand" work (Charlton, 2024; Liu & Muro, 2023).

ELLs are often employed in positions that may not match their level of qualifications or previous experiences and often require lower levels of digital skills. Foreign diplomas are often not recognized in the United States, creating additional barriers even for those who have received a formal education abroad. As one consequence, ELLs disproportionately participate in the gig economy. ELLs may regard the gig economy as a more equal space compared to the barriers in more traditional industries, where wages are correlated with the level of digital skills and medium skill-intensive jobs are shrinking. Platforms such as Uber or Doordash create new opportunities where workers without a college degree can thrive (Herrmann et al., 2023). Many workers turn to the gig economy as a reaction to the lack of accessible traditional jobs (Sundararajan, 2025). While traditional employment pathways require increasing levels of digital literacy, gig economy roles rely on more accessible smartphone-based digital competencies. Gig economy roles draw on socially oriented uses of technology, such as chat communication, with which many ELLs are more familiar. Still, stronger digital proficiency can advantage gig economy workers in ways that meaningfully affect income, such as by leveraging features to optimize availability during surge periods, manage customer ratings, and navigate platform tools. However, gig economy jobs are more unstable and often provide weaker worker protections and limited access to benefits (Sundararajan, 2025).

These labor market dynamics reinforce the importance of digital skills for economic mobility, especially for the ELL population. Strengthening digital literacy can enable workers to transfer skills across jobs, access workforce development programs, and pursue higher-skill employment opportunities. Digital skills are often required to engage with job search platforms and training programs (Hecker & Loprest, 2019), and workers in jobs requiring at least one digital skill earn, on average, 23 percent more than those in jobs requiring none (Bergson-Shilcock & Taylor, 2023). Expanding digital capabilities among ELLs can therefore improve individual economic outcomes while generating broader gains for local, state, and national economies.

Existing Digital Skills Programming

Many forms of digital skills programs exist to address these structural barriers and persistent digital skills gaps, including among ELLs. The programs vary widely in accessibility, scope, and alignment with workforce needs.

Digital skills programming serves a critical purpose given the increasing demand for digital skills in the workforce and the importance of digital skills gaps that disadvantage populations like ELLs. These skills are especially important given that essential services such as government programs, healthcare portals, bank accounts, and resources to find employment are now primarily accessed online. Digital skills programming often equips families to enter and advance in the workforce, build assets, achieve educational goals, and ensure that their children have greater access to the resources and education they need to thrive. More broadly, digital inclusion programs often link skills development with economic mobility outcomes.

A variety of public, private, and nonprofit partners provide digital skills programming. Many of these efforts are part of a broader national ecosystem of practitioners, the National Digital Inclusion Alliance (NDIA), which

promotes integrated approaches combining digital skills training, device access, and connectivity. More than 2000 organizations affiliate with the NDIA, including the IRC and other digital inclusion providers such as the Center for New Americans, the Center for Workforce Inclusion, and the MassHire Metro North Workforce Board (NDIA, n.d.b).

As an example of digital skills programming, the IRC's "Digital Skills for All" program offers classroom instruction and one-on-one support for digital skills learning and is administered by 23 local offices across the United States. This combination of classroom instruction and individualized support is consistent with common delivery models across NDIA-affiliated programs, which frequently pair group learning with one-on-one assistance from digital navigators. Although standard frameworks exist, implementation differs at each local office and can be tailored based on each office's resources, location, partnerships, client population, or priorities. Similar variability in implementation is observed across the field, where programs are often adapted to local contexts, partnerships, and participant needs. As one approach, a few local offices have used the "Digital Literacy for New Americans" curriculum, which consists of 17 modules covering a range of basic to advanced digital skills (IRC, n.d.). As another example, the MassHire Metro North Workforce Board runs a workforce-focused initiative, the Digital JEDI Consortium, which integrates digital skills development with career navigation and job readiness services (MassHire Metro North Workforce Development Board, n.d.).

The Digital Equity Act provided funding to partners to support digital skills programming until its discontinuation in 2025 (NDIA, n.d.c). Despite a shifting and often uncertain funding landscape, many digital inclusion partners have maintained their efforts to equip clients with essential digital literacy skills. Similar efforts are sustained across multi-partner ecosystems in communities nationwide, including municipalities such as Bloomington, Indiana, and Oakland, California, which have been recognized by the NDIA as Digital Inclusion Trailblazers for coordinating digital skills, access, and support across local institutions (NDIA, n.d.a). Understanding the status of digital skills gaps among ELLs and specific risk factors driving lower technology access and digital skills outcomes can help inform strategic investment and program design by employers, policymakers, and partners.

Best Practices in Program Design

Effective program design helps to translate identified digital skills gaps among ELLs into actionable training solutions. By highlighting effective approaches, we can provide employers and policymakers with practical guidance on how to structure training programs that better support workforce readiness for ELL populations. Drawing on a review of best practices from existing literature, this section highlights common barriers to participation, facilitators to implementation, and effective program design that aimed at addressing the digital skills gaps identified in the quantitative analysis.

Several barriers can limit participation in digital skills programs, particularly for ELLs. First, digital skills instruction and learning materials are typically provided in English, making it difficult for those with limited proficiency to understand instructions, follow along during lessons, or ask for assistance (Kim et al., 2025). Additionally, there is often limited awareness of digital skills resources available. For example, many ELLs are not aware that libraries, schools, or community-based organizations often offer digital literacy programs, reducing their likelihood of utilizing these resources (Caidi & Allard, 2005). Furthermore, financial and time constraints also affect participation in digital skills education. The cost of transportation or childcare, in addition to the income lost from missing work, may discourage participation (Kim et al., 2025). While free or low-cost programs can increase accessibility, fixed program schedules may create additional barriers to participation, as the lack of flexibility may conflict with work schedules or family responsibilities (Kim et al., 2025; UNHCR Innovation Service, 2025). For program participants that are new Americans, some may lack trust in the government or local services, which can affect program engagement (Caidi & Allard, 2005; Kim et al., 2025). Together, these challenges underscore the importance of designing digital skills programs that are flexible, culturally relevant, and structured to reduce barriers for ELLs and other new Americans.

Effective programs share several elements that make learning digital skills both accessible and relevant. Across different program models and implementation locations, successful programs focus not only on what skills are taught but the ways in which they are delivered. Drawing on the literature, the following elements illustrate characteristics of effective digital skills programs. Through conversations with digital skill education providers, the Urban Institute emphasized the importance of teaching digital skills in real-world contexts (Hecker & Loprest, 2019). For example, digital skills instruction could involve demonstrating how to create a resume or submit an online job application. Additionally, digital skills education should be designed to match the needs of the population for whom the training is intended (Hecker & Loprest, 2019). This approach can include catering the curriculum to the digital skills needed for a specific industry, offering the training both in person and online, grouping learners by language level, or providing flexible scheduling (Hecker & Loprest, 2019; Kim et al., 2025; Murray & Negoescu, 2019; Pinkett et al., n.d). Tailoring digital skills to a specific industry or job ensures participants learn the tools they will use on the job, ultimately reducing the learning curve and building confidence.

The language of instruction also matters for digital skills programming. As discussed in the Results section of this report, one of the most notable risk factors for technology access is low or no English proficiency. ELLs may be unable to reap the full benefits of digital skills education if they lack English proficiency, ultimately creating additional barriers to their learning (Hecker & Loprest, 2019; Kim et al., 2025). Delivering digital skills programming in clients' native language can reduce the language gap and allow clients to focus on learning the digital skills rather than learning new vocabulary (Pinkett et al., n.d.). Similarly, combining digital skills education with English language learning can reduce barriers to acquiring digital skills while also improving English proficiency. Courses should also be tailored based on language level and the digital skills needed (Pinkett et al., n.d.). Another pedagogical method with proven effectiveness across populations is gamification, which involves using various game design elements in non-game contexts to enhance user engagement, motivation, and learning outcomes (Alnuaim, 2024). Ultimately, effective digital skills education requires intentional design that aims to reduce barriers to access, aligns with industry-specific digital skills, and aligns with the needs of individual participants.

Research Gap on Digital Skills Among ELLs

Existing literature underscores that ELLs face barriers in developing digital skills for workforce readiness, and myriad policy, programming, and funding initiatives exist to support ELLs in overcoming these challenges. However, previous work stops short of exploring the extent of the digital skills gaps among ELLs and identifying the risk factors that underpin lower digital skill levels, ultimately limiting ELLs' economic and career opportunities. This report aims to fill this research gap.

Methods

Our analysis measures ELLs' digital skills against workforce needs to identify potential digital skills gaps, tests the 10 risk factors for digital skills gaps identified above, and compares technology access and digital skills among ELLs to trends at the national level. We utilize two datasets to conduct this analysis. First, the IRC provided us with data from their National Digital Inclusion Alliance (NDIA) Skills Assessment conducted with ELL clients in 2025 and 2026 (IRC, 2026a). The IRC administered this assessment, available in nine languages, to Digital Skills 4 All project participants to establish a baseline understanding of ELL clients' technology access and digital skills. As a result, the unit of analysis is individual respondents. This dataset includes demographic characteristics such as age range, gender, race, nationality, education level, English level, and employment status. Other variables include Likert scale questions assessing respondents' frequency of and confidence in using the internet, technology, and online applications. This analysis excludes responses of "unknown" to demographic and digital skills questions.

The second dataset used in this analysis is the November 2023 Computer and Internet Use Supplement to the U.S. Census Bureau's Current Population Survey sponsored by the National Telecommunications and Information Administration (NTIA) (NTIA, 2023). The November 2023 supplement includes interview responses to questions focused specifically on individual and household access to and use of computers and the internet. The unit of analysis in the November 2023 supplement is individual people aged three years and older residing in households that are part of the NTIA sample.

As a first step in our analysis, we consider the demographic breakdown of the ELLs included in the NDIA dataset. We describe the population in terms of the risk factors identified, which existing literature suggests have impacts on technology access and digital skills outcomes. In particular, we consider English level, age, educational attainment, employment status, gender, nationality, race, and technology access. The dataset shared by the IRC indicates respondents' age group rather than specific age. We define the age-related risk factor as being over 55 years of age, rather than 60 years as in the Digital Equity Act, based on the available categories and as a conservative estimate. We standardize the data on educational attainment using the International Standard Classification of Education (ISCED) from the United Nations and in consultation with the IRC (ILO, n.d.). We focus on low or no educational attainment, defined in our analysis as having "basic" or "less than basic" education according to ISCED, because existing literature suggests that lower education poses the highest risk for digital skills. Collapsing the four-order categorization of education levels from ISCED into a binary "low or no education" variable therefore enables us to make comparisons between the NDIA and NTIA datasets given that the high proportion of advanced education in the NTIA dataset (70 percent) otherwise skews the analysis.

We also consider technology access in two ways. The first measure of technology access is whether a respondent only owns a phone and does not have another device, such as a laptop, desktop, or tablet. More than 98 percent of the NDIA survey respondents reported having a phone. Given this lack of variation, we concluded that analyzing phone access does not provide useful insights. Further, devices other than phones are especially important for digital skills related to workforce integration. For instance, formatting a resume or accessing the U.S. Citizenship and Immigration Services portal is much more difficult to do on a phone than a computer. Our second measure of technology access is whether a respondent has low or no access to the internet. Along with device access, this measure helps gauge respondents' digital connectivity. See Appendix A for more details on the construction of these variables.

Next, we compare the data from the IRC's ELL client population to the digital skills needed for workforce integration to identify potential digital skills gaps. The NDIA assesses 11 digital skills, as outlined in Figure 2. We create an index of digital skills for workforce integration to serve as a composite measure, in addition to analyzing each digital skill separately. Building on the literature examined above that defines digital literacy broadly and discusses the types of skills demanded in the workforce, this index includes eight digital skills for the NDIA analysis: searching and applying for jobs, completing training to improve job skills, accessing or applying for government

services, accessing online banking, finding educational content, using video applications like Zoom, and using a word processing application. See Appendix B for more details on the specific measures for digital skills included in the NDIA.

Figure 2: Digital Skills Assessed by the NDIA

Note: Digital skills colored in red are included in the workforce digital skills index constructed for this analysis.

Third, we analyze technology access and confidence levels with workforce-relevant digital skills within the IRC's ELL client population. This step involves estimating the impact of the risk factors on the likelihood that a respondent only has a phone, the likelihood that a respondent has low or no internet, and the respondent's confidence level in workforce digital skills. Additional analysis considers the impact of the risk factors on the respondent's confidence level in all 11 digital skills included in the NDIA, rather than just the eight workforce skills, and breaks the workforce digital skills index down to consider the impact on each of the 11 individual skills.

Fourth, we compare the NDIA demographics, risk factors, and digital skills gaps for ELLs to the NTIA national level data to illuminate unique considerations for ELLs and inform digital skills programming needs and design. This step only generates valid comparisons if there are reasonable parallels between the two assessments. We

therefore identify eight questions in the NTIA survey that provide reasonable proxies for the digital skills included in the NDIA assessment. All skills assessed by the NDIA are included in the NTIA survey, except two: using a word processing application and searching for information. Two skills assessed by the NDIA — taking a course or training materials to improve job skills and finding educational content and information — are also approximated by one measure in the NTIA assessment pertaining to educational content and job training. We take the same approach as with the NDIA analysis and construct a workforce digital skills index for the NTIA dataset that includes five digital skills. The difference between the NDIA and NTIA workforce digital skills indices reflects the variables included only in the NDIA and not in the NTIA as well as the separate measures for educational content and job training included in the NDIA. See Appendix B for more details on the specific measures for digital skills included in the NDIA versus NTIA.

Finally, the NTIA dataset enables us to extend our model and test additional risk factors not captured in the de-identified NDIA dataset shared by the IRC: geography and income. The NTIA dataset includes a binary variable indicating whether a respondent lives in a metropolitan area. We also use the regional data, which indicates whether respondents live in the Northeast, Midwest, South, or West. Because previous studies suggest that income matters most for digital skills and access at lower levels, we also focus on the impact of low income. For this study, we define low income as households with incomes not exceeding 150 percent of the federal poverty level, in line with the definition included in the Digital Equity Act.

In both the NDIA and NTIA analysis, we include observations which have values for all outcome and predictor variables in our main model. In total, the NDIA analysis includes 1,018 observations, and the NTIA analysis includes 22,861 observations.

We employ multivariate probit to estimate the probability of binary dependent variables. This approach enables us to estimate the marginal effects of various predictor variables on the outcomes of interest. We use this model for all analysis apart from dependent variables measured on a Likert scale. For the variables on a Likert scale — namely digital skills confidence levels — we use ordinary least squares (OLS) regression. We code the first degree of the scale ("Not at all confident") as one, the second degree ("Not too confident") as two, the third degree ("Somewhat confident") as three, and the fourth degree ("Very confident") as four. This model enables us to consider the association between changes in predictor variables and levels of confidence. See Appendix C for more discussion on the OLS model.

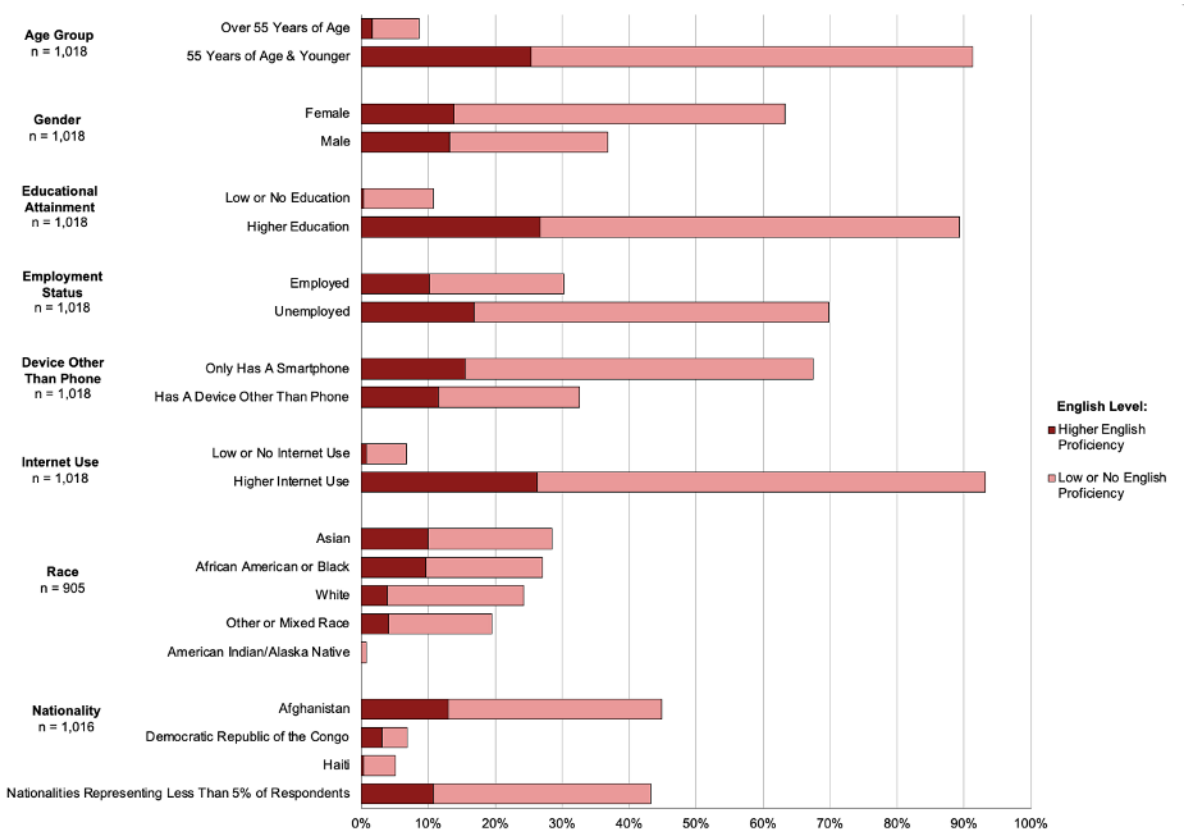
Results

This section reports demographic characteristics of ELLs, digital skills gaps among ELLs, the impact of risk factors on technology access and digital skill gaps among ELLs, comparisons of these trends at the national level and among ELLs, and impacts of additional risk factors available in the national analysis that may be important in understanding technology access and digital skills among ELLs.

ELL Demographics

The NDIA dataset includes demographic characteristics and technology access data for 1,018 respondents. We analyze variation in English proficiency within each demographic characteristic given that ELLs are this report's central focus. As seen in Figure 3, less than 10 percent of the sample of ELLs is over 55 years of age. The dataset includes more females than males, and females tend to have lower English proficiency compared to males, with females who have low or no English proficiency representing about half of the sample. About 63 percent of respondents have more than basic education but have low or no English proficiency. About 70 percent of respondents are unemployed, of whom 53 percent also have low or no English proficiency.

Figure 3: ELL Characteristics from NDIA Assessment



Source: IRC, 2026a.

The most represented nationality is Afghan, comprising 45 percent of the sample. Apart from the Democratic Republic of the Congo and Haiti — which comprise 7 and 5 percent of the sample, respectively — all of the 56 other nationalities represent less than 5 percent of the sample each. We therefore exclude nationality from the main model since there is not enough variation to produce significant estimates on this variable. In robustness checks, we include a binary variable for whether a respondent is Afghan to assess whether this characteristic accounts for meaningful variation in technology access or digital skills. This variable did not generate significant estimates and did not affect the sign, magnitude, and significance of the other estimates.

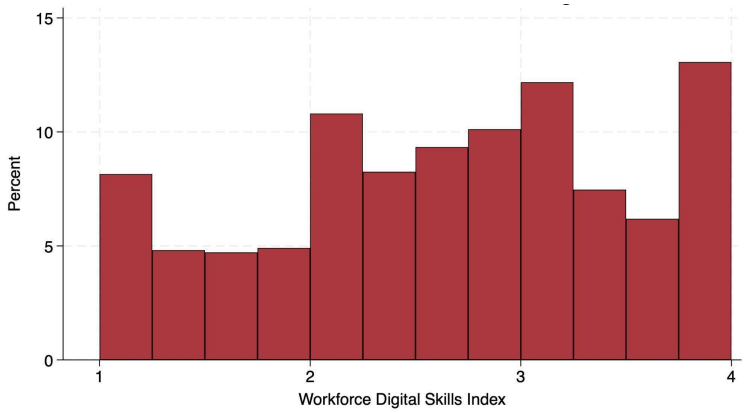
The racial breakdown of ELLs suggests that race may not be a useful variable to consider in this analysis. Almost a quarter of ELLs identified as "other" or "mixed race," which is similar to the proportions of respondents who identified as either "African American or Black," "Asian," or "White." The relatively high number of respondents who did not identify with a particular racial group suggests that race is not a useful distinction when analyzing non-native populations, which aligns with the literature. Although many studies demonstrate that low digital literacy is more likely among racial minorities, race is a less relevant distinction when analyzing non-American populations. Race has disproportionate importance in American society compared to other places, where other social constructs like ethnicity, caste, or socioeconomic class may play a more significant role in identity (Silver 2021; Lee & Tafoya 2006). In robustness checks, we add race as an additional indicator and find some meaningful variation between races in technology access and digital skills. However, the largest and most statistically significant estimate for race corresponds with the "other or mixed race" category, underscoring concerns about the applicability of this characteristic for non-native populations. Further, the sign, magnitude, and significance of the other estimates are largely unaffected. Including data on race in our main model would also require us to drop 11 percent (113 of 1,018) of our observations. We therefore exclude race from this analysis.

Digital Skills Gaps Among ELLs

Next, we examine levels of confidence in workforce digital skills within the IRC's ELL client population. We identify a digital skills gap by comparing confidence levels to the digital skills needed for workforce integration.

Most ELLs report being "Not too confident" in their digital skills for workforce readiness. The mean value for confidence in workforce digital skills among ELLs is 2.59, which corresponds to the "Not too confident" level. As Figure 4 shows, there is considerable variation in digital skills confidence levels among ELLs. However, the higher concentration between scores of two and three ("Not too confident" and "Somewhat confident") indicate relatively moderate confidence levels in workforce digital skills among ELLs. As detailed above, the workforce is increasingly demanding higher levels of digital skills, and even entry level jobs are starting to require modest confidence in digital skills. This lack of confidence reported by ELLs compared to the digital skills demanded by the workforce therefore points to a digital skills gap.

Figure 4: Distribution of Confidence in Workforce Digital Skills



Notes: The NDIA Workforce Digital Skills Index is a measure of respondents' average confidence scores on the workforce-related digital skills evaluated in the NDIA assessment. The index ranges from a score of "1," meaning respondents are "not at all confident," to "4," meaning respondents are "very confident."

Source: IRC, 2026a.

This finding for workforce digital skills appears consistent with trends in all digital skills. The mean value for confidence among ELLs in all 11 digital skills included in the NDIA assessment is 2.57, which is roughly equivalent to the workforce-specific mean value. Figure D1 in Appendix D demonstrates a similar spread of confidence levels among ELLs, with a higher concentration between two and three ("Not too confident" and "Somewhat confident"). In aggregate, the workforce digital skills gap appears similar to all digital skills gap, which includes digital skills for personal use.

Additionally, no individual skill alone seems to drive the digital skills gap. The average values for seven of the eight skills included in the workforce digital skills index correspond with the "Not too confident" category, the second lowest rating. The only skill with a higher average confidence score, searching for information, is just above the cutoff for "Somewhat confident," at a score of 3.02. Therefore, the digital skills gap appears to reflect a general confidence deficit across a broad set of skills.

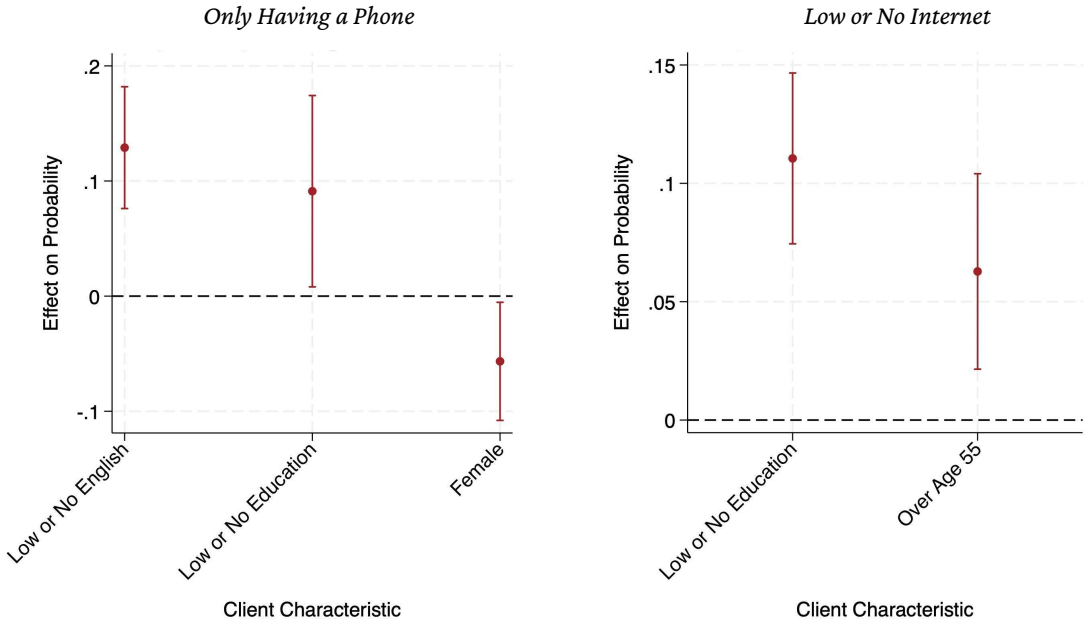
Risk Factors for Digital Skills Gaps Among ELLs

To explore potential drivers of lower technology access and digital skills needed for workforce integration, we test the risk factors identified above.

This analysis suggests that the most salient risk factors for technology access are English proficiency, educational attainment, and gender, as detailed in Figure 5. We estimate the marginal effects of each risk factor on the probability of each technology access outcome. ELLs with low or no English proficiency were about 13 percent ($p<0.01$) more likely, on average, to only have a phone compared to individuals with higher English proficiency. Low or no education also increased the likelihood that an ELL only had a phone by 9 percent ($p<0.1$), on average. Females were 6 percent ($p<0.1$) less likely than males to only have a phone on average. The other predictor variables — age and unemployment — do not produce statistically significant estimates, which suggests that technology access may not vary meaningfully across age or employment status. As an example, when the marginal effects of having low or no English proficiency (positive 12.9 percent), having low or no education (positive 9.1 percent), being female

(negative 5.7 percent), being over age 55 (negative 5.6 percent), and unemployed (positive 2.5 percent) are added to the estimated value of the constant (59.2 percent), the cumulative estimated probability of only having a phone for a female with low or no English proficiency and low or no education is about 72 percent.

Figure 5: Risk Factors for Only Having a Phone and Low or No Internet — ELLs



Notes: The y-axis represents the impact of each risk factor on the probability of only having a phone (left panel) or having low or no internet access (right panel). The probability is "1" when respondents only have a phone or have low or no internet access and "0" otherwise. Brackets indicate 90 percent confidence intervals in the left panel and 95 percent confidence intervals in the right panel. Over age 55 and unemployment did not produce statistically significant predictions of only having a phone. Low or no English proficiency, unemployment, and being female did not produce statistically significant predictions of having low or no internet. We therefore excluded these risk factors from the respective figures.

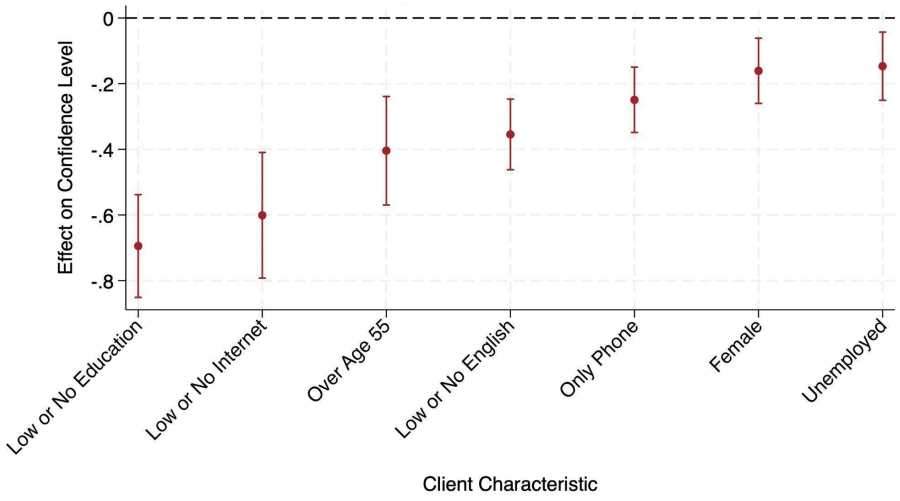
Source: IRC, 2026a.

Educational attainment has the most significant impact on low internet access, increasing the likelihood by 11 percent ($p<0.01$), as seen in Figure 5. Being over 55 years of age was also statistically significantly associated with low internet access, increasing the likelihood by 7 percent ($p<0.01$). Other risk factors, including English proficiency, did not have statistically significant effects.

This analysis suggests that the most salient risk factors that decrease workforce digital skills confidence include educational attainment, technology access, age, English proficiency, gender, and unemployment, detailed in Figure 6. Educational attainment had the highest estimated effect on workforce digital skills, decreasing confidence by 0.69 points ($p<0.01$) on average. Low or no internet access decreased confidence by a similar magnitude, at 0.6 points ($p<0.01$) on average. Being over 55 years old or having low or no English proficiency decreased workforce digital skills confidence by similar amounts, at 0.4 ($p<0.01$) and 0.35 points ($p<0.01$), respectively. Gender, only

having a phone, and unemployment had statistically significant and negative impacts, though these effects were relatively smaller compared to the other risk factors.

Figure 6: Risk Factors for Workforce Digital Skills Confidence — ELLs



Notes: The y-axis shows the average impact of each risk factor on respondents' Workforce Digital Skills Index score. This index is a measure of respondents' average confidence scores on the workforce-related digital skills evaluated by the NDIA assessment. The index ranges from a score of "1," meaning respondents are "not at all confident," to "4," meaning respondents are "very confident." Brackets indicate 95 percent confidence intervals.

Source: IRC, 2026a.

As seen in Figure D2 in Appendix D, the risk factors had similar effects on all digital skills confidence, with the same patterns in statistical significance, the direction of the relationship, and effect size — with one exception. Being female decreased workforce digital skills confidence levels by slightly more than unemployment, though the effect sizes are similar.

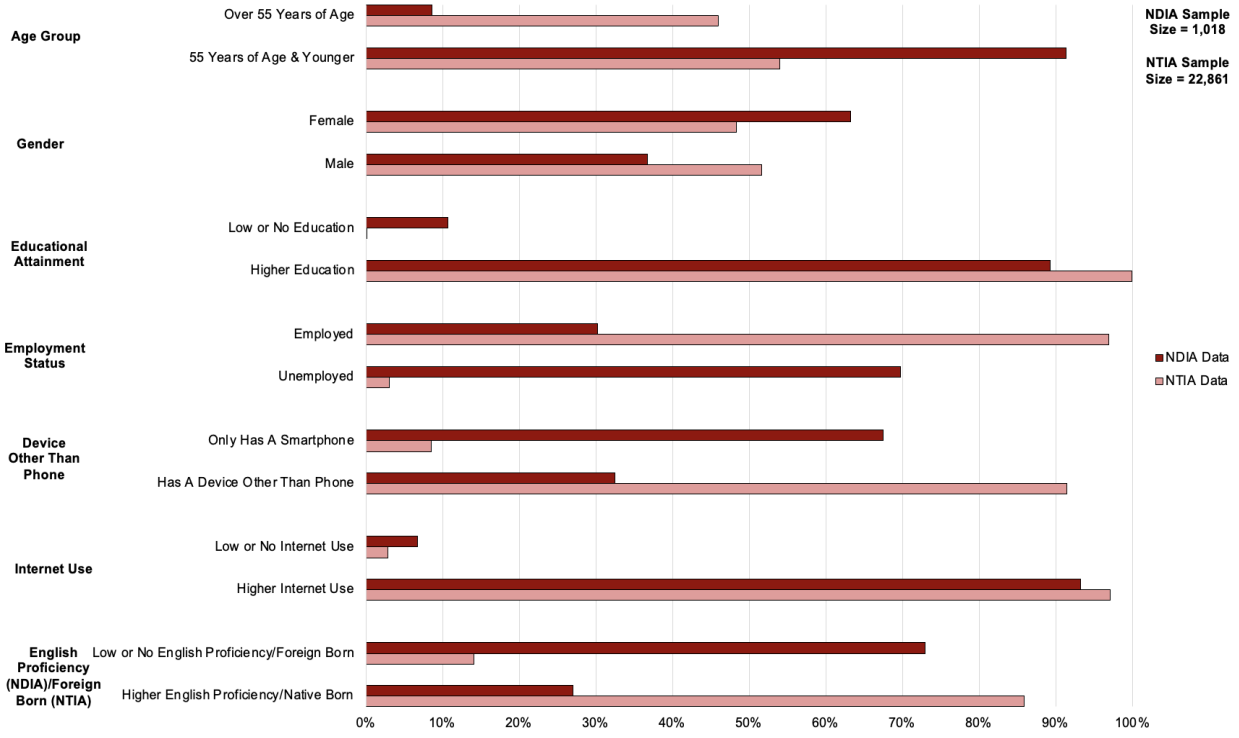
In addition to analyzing the digital skills indices, we also report the effect of risk factors on the confidence level for each of the 11 digital skills included in the NDIA assessment in Appendix E. Low or no education, low or no internet, only having a phone, and low or no English proficiency had a statistically significant negative effect on confidence in each of the 11 digital skills, with slight variation in the effect size by skill. Being over age 55 had a statistically significant negative impact on confidence in every skill except for using a word processing application and finding reliable information about a health or medical condition. Being female or unemployed each had statistically significant impacts on less than half of the 11 digital skills assessed by the NDIA.

U.S National Level Comparison

In this section, we compare the demographics, workforce digital skills gaps, and risk factors for the IRC's ELL client population to the NTIA nationwide sample to identify key similarities and differences. This comparison can illuminate unique considerations for ELLs and inform digital skills programming needs and design.

The demographic composition of the two survey samples highlights several salient differences between the two groups, as seen in Figure 7. The ELLs surveyed by the IRC tend to be younger, female, and unemployed than those in the national sample. A larger share of ELL respondents also only has access to a smartphone compared to the national sample. Language barriers, approximated by the "foreign born" versus "native born" distinction in the NTIA data, appear to be more prevalent among ELLs than in the national sample. While important differences exist, the two populations appear relatively similar on a few characteristics: the majority of respondents in both samples have higher educational attainment, and most are higher internet users. Still, the NTIA sample has even higher shares of respondents in both of these categories, which are associated with higher digital skills levels.

Figure 7: Comparison of Demographics Between NDIA and NTIA



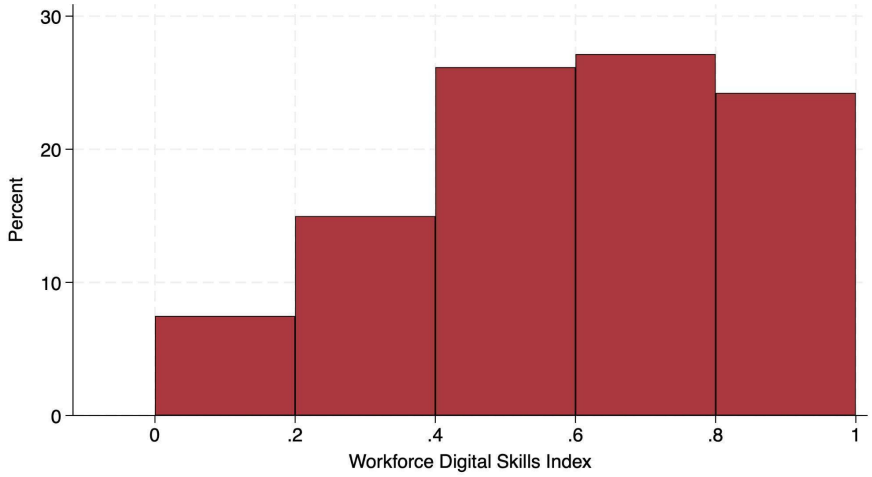
Sources: NTIA, 2023 & IRC, 2026a.

In terms of technology access alone, the digital access disparities appear especially stark for ELLs. Less than 9 percent of NTIA respondents (1,958 of 22,861) only have a phone compared to more than 67 percent of ELLs in the NDIA sample (687 of 1,018). Additionally, 7 percent of ELLs (69 of 1,018) reported low internet access compared to only 3 percent in the national sample (649 of 22,861).

With respect to digital skills, comparisons suggest that national trends in digital skills levels may be roughly similar to trends among ELLs, though ELLs may be slightly disadvantaged. Whereas the NDIA measures confidence levels on a four-point scale, the NTIA asks respondents yes or no questions about whether they have a skill. In the NTIA survey, a value of "1" indicates that an individual has a skill, while a value of "0" indicates the lack of a skill. This difference between the NDIA and NTIA makes it difficult to directly compare the surveys. Still, it is possible to identify broad trends and takeaways. For example, Figure 8 demonstrates the distribution of digital skills, which largely

resembles the spread of confidence levels in the NDIA survey above. More observations are concentrated in the higher range, indicating a higher probability of having digital skills. Indeed, the mean probability of having workforce digital skills in the NTIA survey is 0.50, and the mean probability of having the full range of digital skills is 0.60 (see Figure D3 in Appendix D). These estimates suggest that at least half of the national population has the digital skillset. Whereas the mean value for digital skills in the NDIA survey indicates that ELLs are "Not too confident," this average score in the NTIA survey posits that the digital skills gap may be heightened among ELLs.

Figure 8: National Distribution of Workforce Digital Skills

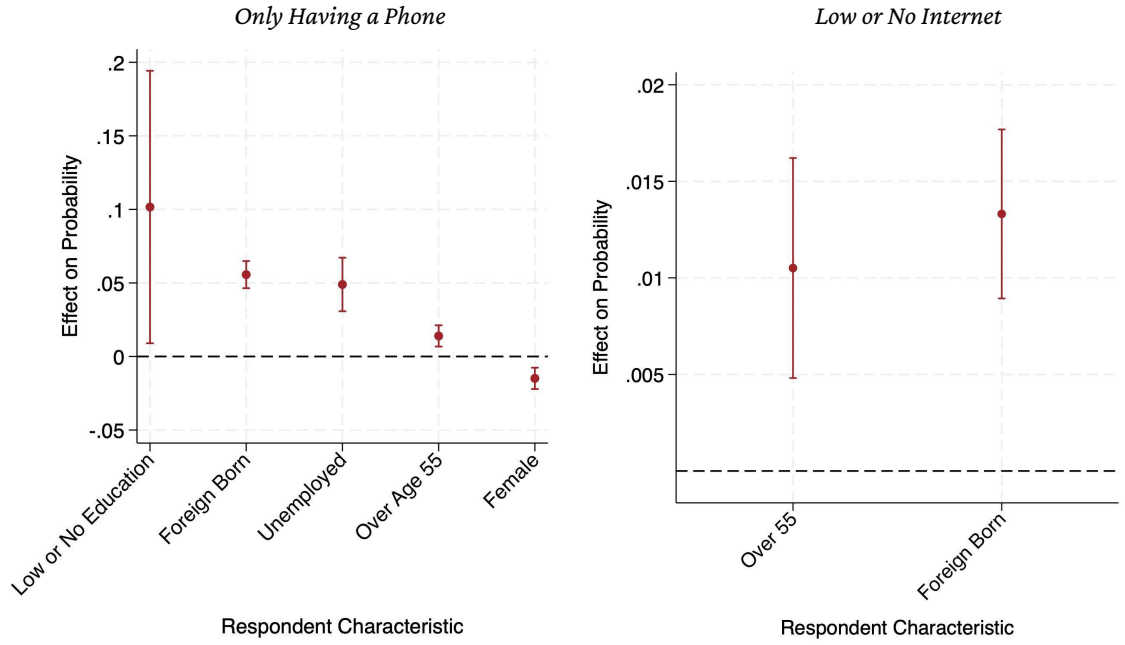


Notes: The NTIA Workforce Digital Skills Index is the average probability that respondents have the set of workforce-related digital skills evaluated in the NTIA assessment and selected to approximate the skills evaluated in the NDIA assessment. The index ranges from a score of "0," meaning respondents do not have the skills, to "1," meaning respondents have the skills.

Source: NTIA, 2023.

Additionally, comparing the direction of the relationship — whether positive or negative — and the relative size of the estimated effect between risk factors in the NDIA and NTIA analysis can provide useful insights between the ELL population and national trends. The NTIA national level data finds that educational attainment has the largest impact on the probability of only having a phone, detailed in Figure 9. Low or no education increased the probability by about 10 percent ($p<0.05$). The NTIA analysis also finds lower technology access among new Americans. Compared to native-born respondents, foreign-born respondents had a 6 percent higher ($p<0.01$) probability of having a non-phone device. Although this variable is an imperfect proxy for English level, which is not captured in the NTIA, this estimate aligns with the findings in the NDIA that suggest this population faces particular challenges with accessing technology. Similar to the analysis of ELLs, females had a higher probability of only having a phone than males in this national sample.

Figure 9: Risk Factors for Only Having a Phone and Low or No Internet — National



Notes: The y-axis represents the impact of each risk factor on the probability of only having a phone (left panel) or having low or not internet access (right panel). The probability is "1" when respondents only have a phone or have low or no internet access and "0" otherwise. Brackets indicate 95 percent confidence intervals in the left and right panels. Low or no education, unemployment, and being female did not produce statistically significant predictions of having low or no internet. We therefore excluded these risk factors from the respective figure.

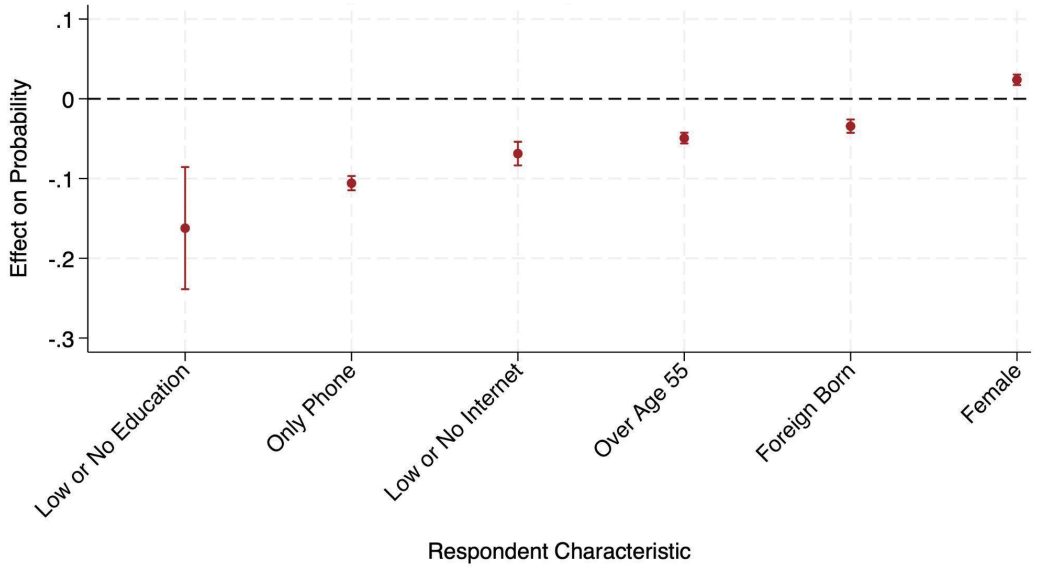
Source: NTIA, 2023.

In addition, unemployment and gender produce statistically significant positive effects in the NTIA survey, whereas the corresponding estimates were statistically insignificant in the NDIA analysis. Unemployment and gender may therefore not be responsible for variation in digital skills among ELLs but could cause more variation in digital skills in the broader population.

With respect to internet access, similar trends emerge at the national level compared to those identified among ELLs. Being over 55 years of age or foreign born increases the likelihood of low internet access, as seen in Figure 9. Other risk factors do not have statistically significant effects.

In line with the analysis of ELLs, the NTIA analysis finds that the most salient risk factors that decrease workforce digital skills include educational attainment, technology access, age, and being foreign born, detailed in Figure 10. In contrast to the findings among ELLs, being female increased workforce digital skills confidence, and unemployment did not produce a statistically significant estimate. These trends are consistent with all digital skills, as seen in Figure D4 in Appendix D.

Figure 10: Risk Factors for Workforce Digital Skills — National



Notes: The y-axis shows the average impact of each risk factor on respondents' Workforce Digital Skills Index score. This index is the average probability that respondents have the set of workforce-related digital skills evaluated in the NTIA assessment and selected to approximate the skills evaluated in the NDIA assessment. The index ranges from a score of "0," meaning respondents do not have the skills, to "1," meaning respondents have the skills. Brackets indicate 95 percent confidence intervals. Unemployment did not produce statistically significant predictions of having workforce digital skills. We therefore excluded this risk factor from the figure.

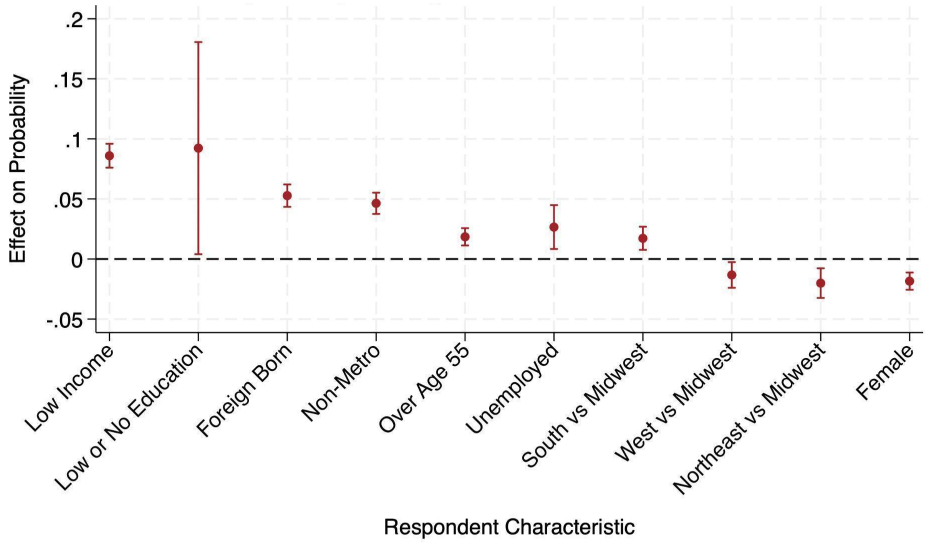
Source: NTIA, 2023.

Extension of U.S. National Level Analysis

The NTIA dataset also allows us to extend our model and consider the impact of risk factors that the literature suggests are salient to understanding technology access and digital skills but were not included in the de-identified NDIA dataset shared by the IRC. In particular, we include binary variables for whether respondents live outside of metropolitan areas and whether respondents are low income. We also consider geographical variation by region. We are able to extrapolate findings from this extended model to the ELL context given the largely parallel patterns between the NDIA and NTIA analyses concerning the impact of risk factors on technology access and digital skills, as established above. We follow the approach used above and exclude any observations with missing values on these risk factors. As a result, the total number of observations in this section of analysis is 22,619.

All of the added variables yield significant estimates for device and internet access and are therefore important risk factors for technology access. Low income has the largest effect of any risk factor, as seen in Figure 11. Living outside of metropolitan areas and living in the South, compared to the Midwest, also have statistically significant positive impacts on the probability of only having a phone. Educational attainment has a positive impact, though the size of the effect is highly uncertain, likely due to the overrepresentation of advanced education in the NTIA sample. Only having a phone is less likely for female respondents and those living in the West and Northeast, compared to those living in the Midwest.

Figure 11: Risk Factors for Only Having a Phone — National (Extended)

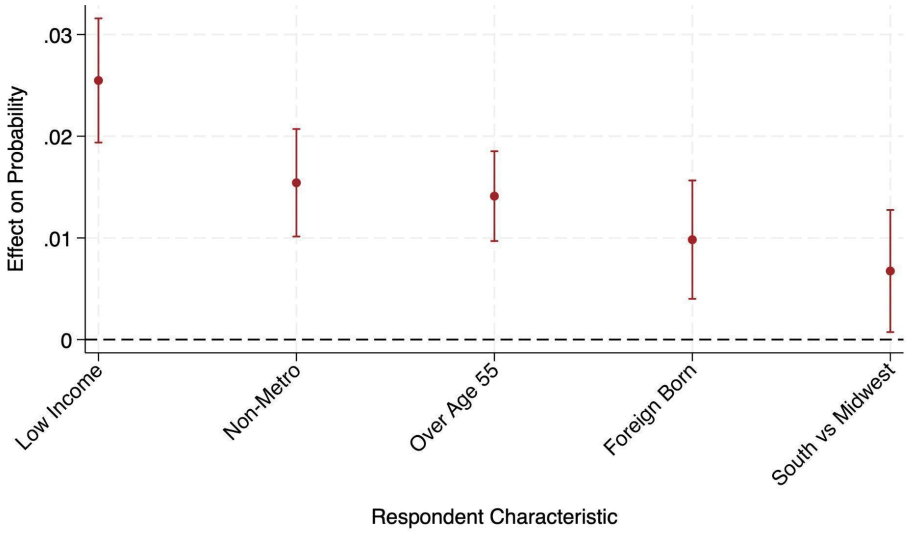


Notes: The y-axis shows the average impact of each risk factor on respondents' Workforce Digital Skills Index score. This index is the average probability that respondents have the set of workforce-related digital skills evaluated in the NTIA assessment and selected to approximate the skills evaluated in the NDIA assessment. The index ranges from a score of "0," meaning respondents do not have the skills, to "1," meaning respondents have the skills. Brackets indicate 95 percent confidence intervals.

Source: NTIA, 2023.

Low income is also the most significant predictor of low internet access in the extended model using national data, as seen in Figure 12. Not living in a metropolitan area also has a relatively large statistically significant positive impact on the probability of low internet access. Even with the additional risk factors included, being over age 55 or being foreign born remain important predictors of low internet access.

Figure 12: Risk Factors for Having Low or No Internet Access — National (Extended)

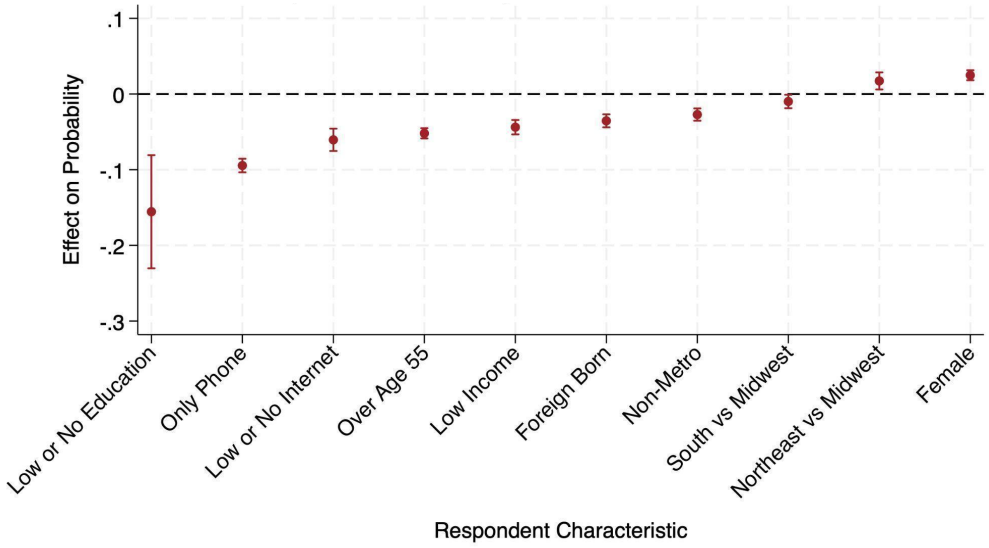


Notes: The y-axis shows the average impact of each risk factor on respondents' Workforce Digital Skills Index score. This index is the average probability that respondents have the set of workforce-related digital skills evaluated in the NTIA assessment and selected to approximate the skills evaluated in the NDIA assessment. The index ranges from a score of "0," meaning respondents do not have the skills, to "1," meaning respondents have the skills. Brackets indicate 95 percent confidence intervals. Low or no education, Northeast vs Midwest, West vs Midwest, unemployment, and being female do not produce statistically significant predictions of having low or no internet. We therefore exclude these risk factors from the figure.

Source: NTIA, 2023.

Similarly, being low income and living outside of metropolitan areas have a statistically significant negative impact on the probability of having workforce digital skills, as seen in Figure 13. This extended model also finds regional disparities, with a lower likelihood of digital skills in the South and higher likelihood in the Northeast, compared to the Midwest. However, educational attainment and technology access have larger negative effects than these additional predictors. These findings suggest that location, rural status, and socioeconomic status are consequential for digital access and literacy, but other factors may be more important.

Figure 13: Risk Factors for Workforce Digital Skills — National (Extended)



Notes: The y-axis shows the average impact of each risk factor on respondents' Workforce Digital Skills Index score. This index is the average probability that respondents have the set of workforce-related digital skills evaluated in the NTIA assessment and selected to approximate the skills evaluated in the NDIA assessment. The index ranges from a score of "0," meaning respondents do not have the skills, to "1," meaning respondents have the skills. Brackets indicate 95 percent confidence intervals. West vs Midwest and unemployment do not produce statistically significant predictions of having workforce digital skills. We therefore exclude these risk factors from the figure.

Source: NTIA, 2023.

The relative effect of these risk factors remains largely consistent when considering all digital skills, not just workforce skills. Educational attainment and technology access remain the most important, as seen in Figure D5 in Appendix D. The metropolitan effect is relatively smaller, and regional effects are no longer statistically significant, which suggests that geographical variation may be most relevant for workforce digital skills.

Discussion

This analysis finds evidence of digital skills gaps among ELLs that create obstacles to workforce integration. Although workforce trends indicate a growing demand for digital skills across all industries, ELLs report being "not too confident" in digital skills needed for workforce integration on average. By comparison, the majority of the NTIA national comparison sample reported having workforce digital skills. Further, being foreign born had a consistently negative and statistically significant impact on digital skills in the NTIA analysis, which suggests that new Americans face unique challenges in developing workforce digital skills, compared to native-born Americans.

The risk factors analysis demonstrates the cross-cutting nature of digital skills gaps. The most important risk factors for low workforce digital skills identified in this analysis include educational attainment, technology access, and English proficiency. ELLs with low or no education had the lowest confidence scores. Both lack of access to devices other than a phone and lack of access to the internet also decreased workforce digital skills confidence. Although our estimates suggest that English proficiency is not the most important risk factor for workforce digital skills, English proficiency had a consistent negative and statistically significant impact on workforce digital skills. Further, these risk factors compound each other: lower educational attainment and English proficiency decreased technology access among ELLs. These findings suggest that, in addition to direct effects on digital skills confidence, educational attainment and English proficiency may indirectly affect digital skills by limiting technology access. Older age, being female, and being unemployed also had statistically significant negative impacts on workforce digital skills confidence, though the effects were relatively smaller than the other risk factors. The negative impact of unemployment on confidence in workforce digital skills is especially notable given that this report focuses on workforce integration for ELLs. However, the small effect size relative to other risk factors suggests that other attributes of ELLs may serve as bigger barriers to digital skills than unemployment. Conversely, while digital skills play a large and increasing role in workforce integration, other risk factors may serve as bigger barriers to employment than digital skills. This analysis validates English language proficiency as an important pathway to digital skills development for ELLs while also advocating for a broader approach. Other salient risk factors identified in this analysis that contribute to lower workforce digital skills create opportunities for effective integration of digital skills programming with other support services, such as education.

The national level comparison largely parallels the trends among ELL respondents, finding that educational attainment, technology access, and being foreign born decreased the likelihood that individuals had workforce digital skills. Being over 55 years of age also had a negative effect on workforce digital skills. The similarities between the baseline NDIA and NTIA models suggest that we can extend the NTIA model to utilize the wider range of demographic characteristics included in this national survey and extrapolate lessons that may be relevant to the ELL population. Considering three additional risk factors — metropolitan status, region, and low income — points to demographic characteristics that may be even bigger drivers of technology access and workforce digital skills. Low-income status had the largest negative effect on both measures of technology access. Metropolitan status also contributed to less device and internet access, and statistically significant effects for different regions suggest that geographical variation matters. Concerning workforce digital skills, educational attainment, technology access, and being foreign born remained important risk factors in the extended model, but low-income status, metropolitan status, and region explained some of the variation as well. This extended model therefore suggests that efforts to strengthen workforce digital skills should also take geography and socioeconomic status into account.

The NDIA and NTIA datasets have similar limitations, as both rely on self-reported data, which may be subject to recall or reporting bias. In particular, any gender effect related to confidence levels reported in the NDIA survey should be interpreted with caution. Previous studies find that gender differences in confidence levels may reflect psychological tendencies more than abilities, with women usually assessing their own digital abilities lower than men's self-assessments (Hargittai & Shafer, 2006; Helsper & Eynon, 2013; Whitley, 1997). Additionally, this analysis of risk factors estimates probabilities and associations, but cannot determine causality. However, the risk

factors identified still point to patterns and relationships that warrant attention in policy and practice. These datasets also capture a snapshot in time and do not follow the same individuals over time. This analysis is therefore not able to assess the effectiveness of programming targeted at advancing workforce digital skills among ELLs or in the broader population. Further, data collection took place at different times, with the NTIA supplement administered in 2023 and the NDIA survey administered in 2025 and 2026. While only a few years, this gap should be noted, especially given the pace of technological advancement.

Going forward, more research is needed to fill the identified information gaps and further advance workforce digital skills outcomes for ELLs. For example, analyzing the types of digital skills in highest demand among employers and career aspirations of ELL clients can strengthen programming for industry- and client-specific needs. Directly leveraging demographic data on ELLs' socioeconomic status and location can test whether the trends identified in the national-level comparison hold within the ELL population, while also assessing their relative importance and implications. Additionally, expanding data collection to include baseline data on individuals' advanced digital skills, in addition to the basic and intermediate skills assessed in current surveys, can help refine the definition of the digital skills gap and track progress in improving digital literacy and workforce outcomes.

While continued research will be important, the digital skills gap among ELLs identified in this analysis underscores the need for targeted and integrated support from a range of stakeholders to improve workforce readiness within this population. The risk factors that contribute to lower technology access and digital skills confidence and ability, according to our analysis, can inform approaches to address barriers and increase digital literacy for ELLs. The evidence from this analysis provides a sufficient foundation to motivate the following recommendations.

Recommendations

We propose several recommendations based on our analysis of digital skills among ELLs. The first set of recommendations (1.1 to 1.4) offers practical steps to enhance digital skills programming for ELLs. The second set of recommendations (2.1 to 2.4) supports programming by strengthening the enabling environment. While each recommendation highlights specific roles and responsibilities for different organizations, their success ultimately depends on sustained collaboration and coordination across stakeholders. **No single actor can implement these changes in isolation, making partnership essential to effectively strengthen ELLs' digital skills for workforce integration.**

Table 1: Summary of Policy Recommendations

Programming	Enabling Environment
1.1 Focus digital skills programming on developing digital literacy, not just individual skills	2.1 Expand device and internet access to support digital skills development among ELLs
1.2 Align digital skills programming with workforce trends and needs	2.2 Strengthen data collection on advanced digital skills and employer demand
1.3 Integrate digital skills programming with other relevant services	2.3 Prioritize a place-based approach to digital skills and workforce programming
1.4 Implement monitoring and evaluation processes to strengthen digital skills programming	2.4 Support educational pathways and advanced digital skills development

1. Programming Recommendations

1.1 Focus Digital Skills Programming on Developing Digital Literacy, Not Just Individual Skills

Digital skills training providers should shift the focus of programming from developing specific skills to advancing digital literacy more broadly. This analysis of digital skills among ELLs indicates that digital skills gaps are not driven by deficiencies in a single skill. Instead, respondents from the NDIA survey indicated relatively low confidence across nearly all workforce-related digital skills. Programming should therefore focus on the broader struggles that ELLs face when interacting with digital technologies rather than abilities related to particular skills or tasks. For example, curricula based on general digital literacy concepts could focus on developing problem-solving skills, digital confidence, and adaptability to tackle unfamiliar technologies. This shift in programming moves away from teaching digital skills as specific, task-based applications and instead would position digital literacy as the core objective of the curriculum that will allow individuals to navigate and adapt to new technologies. By changing the emphasis to digital literacy, programming can better equip clients to learn and apply digital skills across the ever-changing digital landscape.

1.2 Align Digital Skills Programming with Workforce Trends and Needs

Digital skills training providers, including libraries and workforce development boards, should ensure that programming is aligned with workforce and industry needs. In line with recommendation 1.1, the main goal of digital skills programming should be to strengthen participants' digital literacy by instilling general confidence in a range of digital skills. While broader digital literacy is paramount and digital skills are also increasingly necessary for personal use, programming should still be relevant to the types of workforce skills that employers seek. Alignment with workforce needs is especially important in view of the increasing importance of industry-specific specific skills

in the workforce. We therefore recommend that employers should work with program delivery partners to ensure that training prepares ELLs adequately and appropriately for workforce demands. Governments can further support this strategic design of digital skills programming for workforce readiness through funding allocation.

Given the upward trends in workforce digitalization, including in the current industries and positions that ELLs are placed in, digital skills programming for workforce readiness must support the full continuum of digital skills development. First and foremost, digital skills programming must ensure the delivery of basic digital skills training, such as operating a laptop, creating a resume, applying for a job, and navigating job search platforms to directly apply digital skills and facilitate workforce integration. As positions demanding higher levels of digital skills become an increasing share of the available jobs, development of more specialized digital skills will be essential to support the career advancement of ELLs. These specialized digital skills can include basic IT tools, standard health monitoring technology, computer numerical control equipment, basic enterprise management software, customer relationship management software like Salesforce or SAP, or spreadsheet programs like Microsoft Excel (Muro et al., 2017). Training may be improved through "in context" training targeting the specific needs and tools identified by industries or even partner companies. Courses teaching more industry-specific digital skills will require close partnership between digital skills training providers and employers looking to hire ELL clients. Close coordination will allow for more successful alignment with workforce needs and could even create networking opportunities between employers and clients.

Preparing ELLs for digital skills jobs that require more digital skills can unlock new jobs with higher incomes and more stability, especially given the trajectory of increasing workforce digitalization. As mentioned previously, positions that demand limited digital skills have been shrinking, while occupations that demand more digital skills are growing rapidly. This trend suggests that workforce readiness programming should aim to equip workers for more digital skill-intensive positions to keep pace with workforce trends and maximize economic opportunity. Effective and sustainable efforts to improve workforce readiness should also address barriers beyond digital skills that may compound the barriers that ELLs face in accessing more digital skill-intensive jobs, such as education.

1.3 Integrate Digital Skills Programming with Other Relevant Services

Digital skills training providers should ensure digital skills programming is integrated with English language training, among other relevant services. Several risk factors, as emphasized in our analysis, are associated with lower workforce digital skills, including lower education, lower English proficiency, and low income. These risk factors can also create barriers to participation in digital skills programming. Combining programming can address these cross-cutting risk factors and promote coordination. As a key example, integrating digital skills and English language programming enables participants to simultaneously advance their digital skills and language proficiency, strengthening their workforce readiness on two fronts. While integration can strengthen digital skills, program participation and outcomes, partners should still distinguish programming by participants' digital skill level to ensure accessible and appropriately paced instruction. Engaging participants in programming that is not aligned with their skill level can lead to decreased motivation and confidence.

Further, the importance of "in context" training, as described in recommendation 1.2, demonstrates that digital skills should not be taught in isolation; instruction is most effective when applied directly to the skills and environments that participants will likely have to navigate in the future. Workforce readiness training that directly facilitates skill building in applied settings is therefore an especially compelling candidate for integration with digital skills programming.

1.4 Implement Monitoring and Evaluation Processes to Strengthen Digital Skills Programming

Digital skills training providers should implement regular monitoring and evaluation processes to assess the effectiveness of digital skills programming and better understand clients' employment capabilities and career

aspirations. As digital skills demands change with new technologies and workforce trends, programs must be regularly evaluated and adjusted to ensure they successfully meet the needs of participants. Monitoring and evaluation could involve administering assessments during and after programming to assess whether curricula increase digital skill confidence and progress skill development. In addition to evaluating program outcomes, collecting information on participants' employment goals and career interests can help to align digital skills programming with the workforce pathways that clients desire. By capturing post-program employment outcomes, training providers can measure the extent to which programming supports career advancement and identify broader trends in employment placement based on digital skills outcomes.

In addition, policymakers should allocate additional funding to support monitoring and evaluation for digital skills development among ELLs and beyond. Previously, the Digital Equity Act supported this data collection, enabling ongoing program improvement. With these funds discontinued, more support is needed to establish clear monitoring and evaluation processes that ultimately enable more effective programs. Robust evaluation processes can also demonstrate program effectiveness to employers and partners, which can help secure additional funding in the future.

2. Enabling Environment Recommendations

2.1 Expand Device and Internet Access to Support Digital Skills Development Among Ells

Digital skills training providers should prioritize digital inclusion efforts that expand access to laptops and reliable internet for ELLs, particularly among high-risk groups. Access to technology is a prerequisite for building workforce-relevant digital skills, yet our analysis reveals that ELL populations are less likely to have a device other than a smartphone compared to other populations. Limited access to laptops or computers restricts opportunities to develop digital skills that are necessary for employment, many of which cannot be adequately performed on a mobile device such as formatting a resume, completing online workforce training, or accessing government services.

Implementing this recommendation will require training providers to develop and expand partnerships with local or national businesses in the computer manufacturing industry or through NGOs to meet the volume of computers required. Partners supporting digital skills development should integrate support in accessing the internet and devices other than phones into existing workforce and digital skills programming.

Potential strategies include partnerships with technology donation programs, laptop lending libraries, and subsidized broadband initiatives. Whenever possible, technology access support should also prioritize participants with multiple risk factors for low workforce digital skills, such as older clients with low education and limited English proficiency. Facilitating access to critical technological resources can address a key barrier in digital skill development and improve workforce readiness and economic integration for ELLs and beyond. Addressing the technology access gap will require collective action from digital training organizations, computer manufacturing corporations, and other stakeholders including policymakers, libraries, and employers.

2.2 Strengthen Data Collection on Advanced Digital Skills and Employer Demand

Digital skills training providers should expand digital skills assessments to capture information on the types of digital competencies demanded in the labor market. The NDIA assessment provides useful insights into confidence in basic digital skills and confidence levels among ELLs. However, the assessment stops short of assessing more advanced digital skills. As an example, measuring ELLs' confidence in using AI can establish a baseline for the extent to which ELLs are leveraging these skills and tools. Increasing confidence in using AI for translation may reduce the impact of language barriers and facilitate workforce integration for ELLs. Baseline assessments of specialized digital skills among ELLs will be especially helpful going forward given the increasing importance of these advanced digital skills in the workforce. Relatedly, by working together with employers and local partners, digital

skills training providers can help identify which advanced digital competencies are in highest demand, determine the most relevant programming for participants, and position ELLs for career advancement.

2.3 Prioritize a Place-Based Approach to Digital Skills and Workforce Programming

Digital skills training providers should adopt a "place-based" approach to digital skills programming that aligns programming for ELLs with economic opportunities, market demands, and community resources within the region of the clients' home. This type of strategy is especially important in the case of digital skills programming given the geographic disparities resulting from digitalization and the differences in workforce opportunities and digital access across locations. Policies and programming should therefore be designed around the specific needs of the region. For example, Microsoft has developed and recently expanded the TechSpark program in line with this place-based approach (Liu & Muro, 2023). TechSpark focuses on supporting local digital transformation and economic development in small and mid-sized communities, as well as in several metropolitan areas, with the goal of addressing the digital divide (Microsoft, n.d.). Several federal initiatives also encourage place-based strategies in federal economic policy, including the American Rescue Plan Act (ARPA), the CHIPS and Science Act, and the Infrastructure Investment and Jobs Act (IIJA). This type of programming would require leveraging expertise of community networks and local organizations to identify specific barriers that residents face. By adopting a place-based approach, these digital skills training providers can strengthen partnerships with local governments, workforce boards, community colleges, employers and community-based organizations to connect ELL clients to employment pathways and address local barriers to digital access.

2.4 Support Educational Pathways and Advanced Digital Skills Development

Digital skills training providers should support ELLs in attaining higher levels of education, especially given that lower educational attainment is a leading risk factor for lower digital skills levels. Expanding educational opportunities for ELLs can indirectly raise digital skills levels given that educational environments encourage the use of digital devices, facilitate access to technology, and help ELLs gain familiarity applying digital skills in an instructional setting. Supporting ELL clients, especially youth, to pursue college degrees or substantial workforce credentials in fields that require advanced level digital literacy may also help improve long term employment opportunities. To support this recommendation, these organizations should establish partnerships with local universities, community colleges, and workforce development organizations to facilitate enrollment and participation in classes to improve general education and digital skills. In addition, policymakers should support ELLs' educational attainment, including through increased financial assistance to reduce financial barriers.

Conclusion

ELLs face intersecting social, political, and economic challenges when integrating into the U.S. workforce. Digital skills represent an important barrier, especially given the acute gap in digital skills identified among ELLs and in view of the increasingly digitalized workforce. At the request of the IRC, we examine digital skills gaps among ELLs and translate the findings into actionable recommendations for employers, policymakers, and partners seeking to improve workforce readiness for ELLs.

Survey data analysis suggests that the digital skills gap for workforce readiness is especially acute for ELLs, in comparison to national trends. ELLs reported that they are "not too confident" in nearly all workforce-related skills, whereas respondents in the national sample were more than 50 percent likely to have workforce-related digital skills. Educational attainment and technology access were the strongest predictors of lower digital skills levels. Similarities in the risk factors analysis between the ELL and national samples enabled us to extend the national level analysis with additional available data and extrapolate findings to the ELL population. In particular, this extended analysis suggests that geography and socioeconomic status are strong risk factors for lower technology access and digital skills.

Based on these findings, we developed eight recommendations organized into two categories: digital skills programming and strengthening the enabling environment. Collectively, these recommendations emphasize the need to prioritize digital literacy and better align training with labor market demands and localized workforce trends, which will require intentional program design and targeted data collection. These recommendations also highlight ways to tackle structural barriers to advancing digital literacy, including the need to address deficiencies in access to devices other than phones and the internet. Overall, this report emphasizes the importance of addressing digital skills gaps among ELLs and advancing digital literacy to help employers access an underutilized labor force and provide employment opportunities to a traditionally vulnerable population.

Appendices

Appendix A: Construction of Variables

Low or No English Proficiency / Foreign Born

We use a binary variable for low or no English proficiency in the NDIA analysis. Respondents who indicated "None" or "Some" for English proficiency were coded as "1." Respondents who indicated "Good" or "Excellent" for English proficiency were coded as "0."

The NTIA analysis does not include data on English proficiency; instead, we include a binary variable indicating whether a respondent was foreign born. This variable serves as a reasonable proxy and is important to include in this analysis given the focus on ELLs. Respondents who were foreign born were coded as "1," while respondents who were native born were coded as "0."

Low or No Education

We use a binary variable for low or no education in the NDIA and NTIA analysis. Respondents with "basic" or "less than basic" education, according to the International Standard Classification of Education from the United Nations (ILO, n.d.), were coded as "1." Respondents with "intermediate" or "advanced" education were coded as "0." This binary variable approach, as opposed to analyzing the four-order categorization of education levels, is especially appropriate for the national level comparison step because the high proportion of advanced education in the NTIA dataset (70 percent) otherwise skews the analysis. Table 2 shows the classification of education levels across the NDIA and NTIA, developed in consultation with the IRC.

Table A1: Classification of Educational Attainment

ISCED Aggregate Level of Education	Concordances with ISCED-11	NDIA	NTIA
Less than basic	Early childhood education	None	Less than 1st grade
Basic	Primary education Lower secondary education	Primary Intermediate	1st, 2nd, 3rd or 4th grade 5th or 6th grade 7th or 8th grade
Intermediate	Upper secondary education Post-secondary non-tertiary education	Secondary Pre-university	9th grade 10th grade 11th grade 12th grade no diploma High school grad-diploma or equiv (GED)
Advanced	Short-cycle tertiary education Bachelor's or equivalent level Master's or equivalent level Doctoral or equivalent level	Technical school University/ college Graduate school	Some college but no degree Associate degree-occupational/ vocational Associate degree-academic program Bachelor's degree (e.g., BA, AB, BS) Master's degree (e.g., MA, MS, MEng, MEd, MSW) Professional school degree (e.g., MD, DDS, DVM) Doctorate degree (e.g., PhD, EdD)

Low or No Internet

We use a binary variable for low or no access to the internet in the NDIA and NTIA analysis. In the NDIA analysis, respondents who report "I don't use the internet" or report using the internet "Once a week or less" were coded as "1." Respondents who reported using the internet "A couple times a week, "Once a day," or "Several times a day" were coded as "0." In the NTIA analysis, respondents who report having no internet at home were coded as "1," while respondents with home internet were coded as "0."

Only Phone

We use a binary variable for whether a respondent only has a smartphone in the NDIA and NTIA analysis. Respondents who only have a smartphone are coded as "1," while respondents who indicate having a device other than a phone are coded as "0."

Over Age 55

We use a binary variable for whether a respondent is over 55 years of age in the NDIA and NTIA analysis. Respondents who are over age 55 are coded as "1," while respondents who are 55 years of age or younger are coded as "0."

Unemployed

We use a binary variable for whether a respondent is unemployed in the NDIA and NTIA analysis. In the NDIA dataset on ELLs, we considered respondents unemployed if they selected "Has never worked in the US" or "Currently unemployed." In the NTIA analysis, we considered respondents unemployed if they reported being "unemployed-on layoff" or "unemployed-looking" in the monthly labor force recode question (coded as "PEMLR") and reported being full time or part time unemployed in the full or part time work status question (coded as "PRWKSTAT"). Respondents in the NTIA survey who indicated that they were not in the labor force were excluded from the analysis. Respondents considered unemployed were coded as "1," while other respondents were coded as "0."

Female

We use a binary variable for whether a respondent is female in the NDIA and NTIA analysis. Respondents who are female are coded as "1," and respondents who are male are coded as "0."

*Non-Metropolitan

We use a binary variable for whether a respondent is located outside of a metropolitan area in the NTIA analysis. Respondents who do not live in metropolitan areas are coded as "1," while respondents who live in metropolitan areas are coded as "0."

*Region

We use binary variables to indicate whether respondents live in the Northeast, Midwest, South, or West in the NTIA analysis. Respondents are coded as "1" for the region in which they live and "0" for all other regions.

*Low Income

In the NTIA analysis, we use a binary variable for whether a respondent's household income is below 150 percent of the federal poverty level (FPL), in line with the "covered population" definition included in the Digital Equity Act. We construct this variable by first calculating the 150 FPL income threshold for each household size, according to the 2023 levels defined in the Federal Registrar (DHS, 2023). We then compare household income (coded as "HEFAMINC") to this 150 percent FPL threshold according to household size. We code respondents as "1" when below the threshold and "0" otherwise. Household income in the NTIA is indicated by categories representing ranges of incomes. We only code respondents as low income when the entire range of income is below the 150 FPL threshold. As a result, this variable likely underestimates the prevalence of low income.

**These three variables are only included in the extended NTIA model, as the data is not available in the NDIA dataset from the IRC.*

Appendix B: Digital Skills and Indices

Table B1 summarizes the specific survey questions on digital skills that are relevant to this analysis. We include all skills surveyed in the NDIA. The selection of questions from the NTIA is meant to mirror the NDIA measures as closely as possible to enable comparison. Building on examples and precedent in the literature, we create a subgroup of digital skills for workforce integration. For both groups - "All Digital Skills" and "Workforce Digital Skills" - we create indices by averaging the values for each digital skill included in the group.

Table B1: Digital Skills Included in Analysis

Index	NDIA (four-degree confidence levels)	NTIA (yes/no questions)
All Digital Skills	NDIA Q4 Baseline - Searching for information NDIA Q5 Baseline - Searching for and applying for jobs, including creating and submitting a resume NDIA Q6 Baseline - Finding reliable information about a health or medical condition NDIA Q7 Baseline - Accessing online banking or financial services NDIA Q8 Baseline - Taking a course or training materials to improve your job skills NDIA Q9 Baseline - Accessing or applying for government services NDIA Q10 Baseline - Finding educational content and information NDIA Q11 Baseline - Using a video application, such as Zoom NDIA Q12 Baseline - Using a word processing application, such as Google Docs or Microsoft Word to create a document NDIA Q13 Baseline - Shopping online NDIA Q14 Baseline - Finding tools to keep my information safe and secure online	In the past six months, (have/has) (you/ NAME) participated in video or voice calls or conferencing over the Internet, such as with Face Time or Zoom? (Do you/Does NAME) participate in video or voice calls or conferencing? In the past six months, (have you/has NAME) used the Internet to search or apply for a job? (Do you/Does NAME) use the Internet to search or apply for a job? What about online classes or job training? (Do you/Does NAME) use the Internet for educational classes or job training? What about accessing government services, such as registering to vote or renewing your driver's license? In the past six months, (have/has) (you/ NAME) used the Internet for online shopping, travel reservations, or other consumer services on the Internet? (Do you/Does NAME) use the Internet for online shopping, travel reservations, or other consumer services? (Do you/Does NAME) use the Internet for financial services such as online banking, investing, paying bills, or sending money to other people using services like CashApp, Venmo, or PayPal? (Do you/Does anyone in this household) research health information online, such as with WebMD or similar services? During the past year, have concerns about privacy or security stopped (you/anyone in this household) from

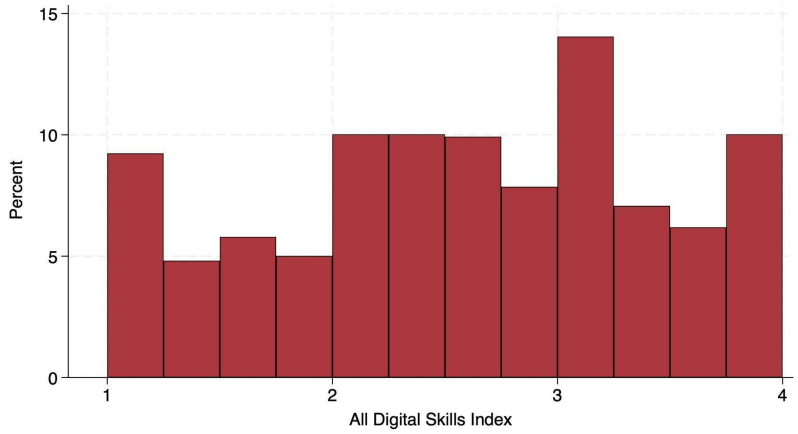
		doing any of these activities online: Conducting financial transactions such as banking, investing, or paying bills online?
Workforce Digital Skills	NDIA Q4 Baseline - Searching for information NDIA Q5 Baseline - Searching for and applying for jobs, including creating and submitting a resume NDIA Q7 Baseline - Accessing online banking or financial services NDIA Q8 Baseline - Taking a course or training materials to improve your job skills NDIA Q9 Baseline - Accessing or applying for government services NDIA Q10 Baseline - Finding educational content and information NDIA Q11 Baseline - Using a video application, such as Zoom NDIA Q12 Baseline - Using a word processing application, such as Google Docs or Microsoft Word to create a document	In the past six months, (have/has) (you/ NAME) participated in video or voice calls or conferencing over the Internet, such as with Face Time or Zoom? (Do you/Does NAME) participate in video or voice calls or conferencing? In the past six months, (have you/has NAME) used the Internet to search or apply for a job? (Do you/Does NAME) use the Internet to search or apply for a job? What about online classes or job training? (Do you/Does NAME) use the Internet for educational classes or job training? What about accessing government services, such as registering to vote or renewing your driver's license? (Do you/Does NAME) use the Internet for financial services such as online banking, investing, paying bills, or sending money to other people using services like CashApp, Venmo, or PayPal?

Appendix C: OLS Model for Confidence Intervals

We conducted statistical tests to confirm that this OLS model is appropriate for analyzing confidence levels. Cronbach's alpha, measured on a scale of zero to one, tests the reliability of surveys with Likert scale responses. Values exceeding 0.7 generally indicate meaningful variation in survey responses. Both of our analytical approaches to analyzing these dependent variables as indices — including all digital skills assessed in the NDIA assessment and as a sub-set of skills specific to workforce integration — generate Cronbach's alpha values above the threshold, at 0.94 and 0.92, respectively. Thus, linear regression is an appropriate approach to analyzing these dependent variables comprising confidence levels.

Appendix D: Analysis of All Digital Skills

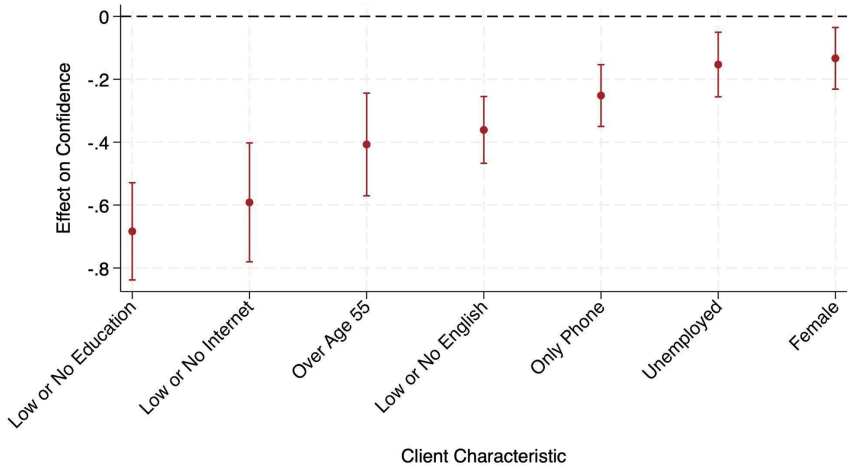
Figure D1: Distribution of Confidence of All Digital Skills



Notes: The NDIA All Digital Skills Index is a measure of respondents' average confidence scores across all digital skills evaluated in the NDIA assessment. The index ranges from a score of "1," meaning respondents are "not at all confident," to "4," meaning respondents are "very confident."

Source: IRC, 2026a.

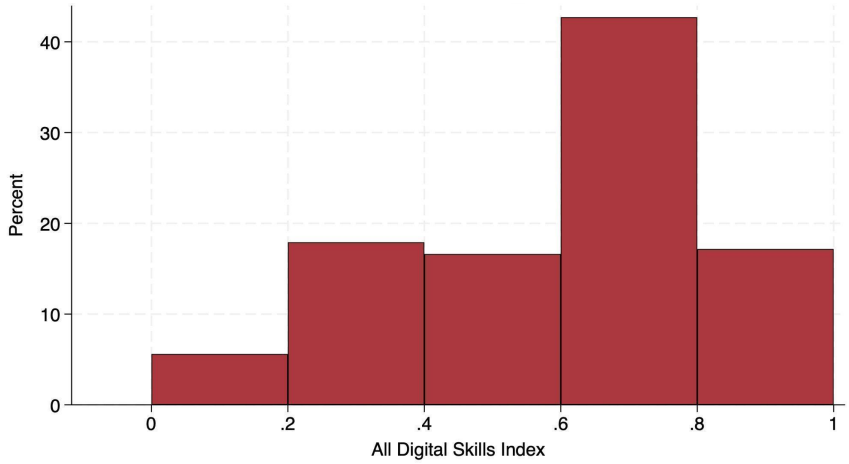
Figure D2: Risk Factors for All Digital Skills Confidence — ELLs



Notes: The y-axis shows the average impact of each risk factor on respondents' All Digital Skills Index score, a measure of respondents' average confidence scores on the digital skills evaluated by the NDIA assessment. The index ranges from "1," meaning respondents are "not at all confident," to "4," meaning respondents are "very confident." Brackets indicate 95 percent confidence intervals.

Source: IRC, 2026a.

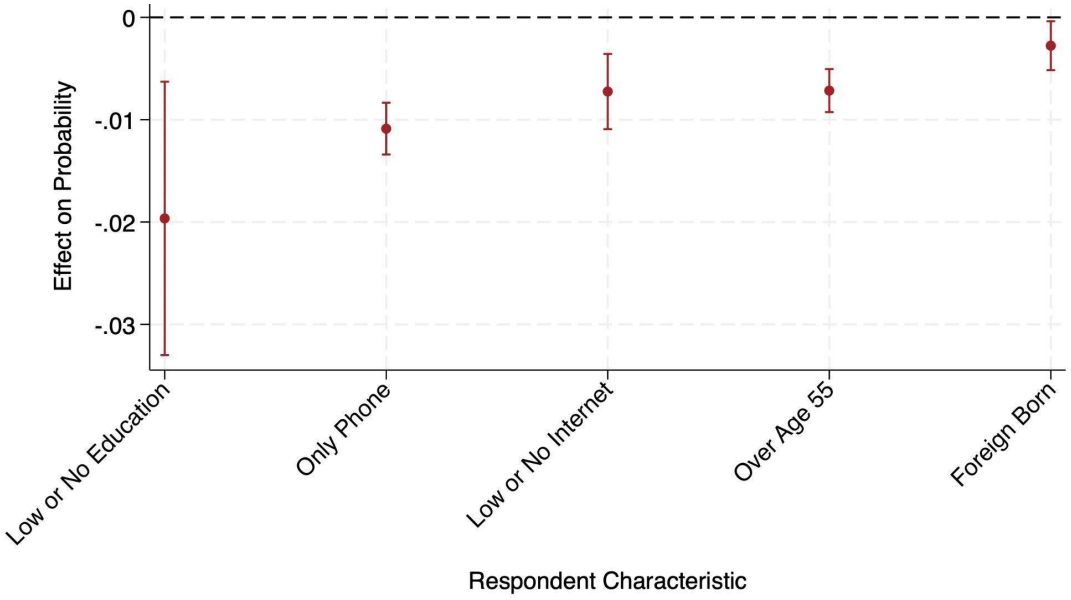
Figure D3: National Distribution of All Digital Skills



Notes: The NTIA All Digital Skills Index is the average probability that respondents have the set of digital skills evaluated in the NTIA assessment and selected to approximate the skills evaluated. The index ranges from a score of "0," meaning respondents do not have the skills, to "1," meaning respondents have the skills.

Source: NTIA, 2023.

Figure D4: Risk Factors for All Digital Skills — National

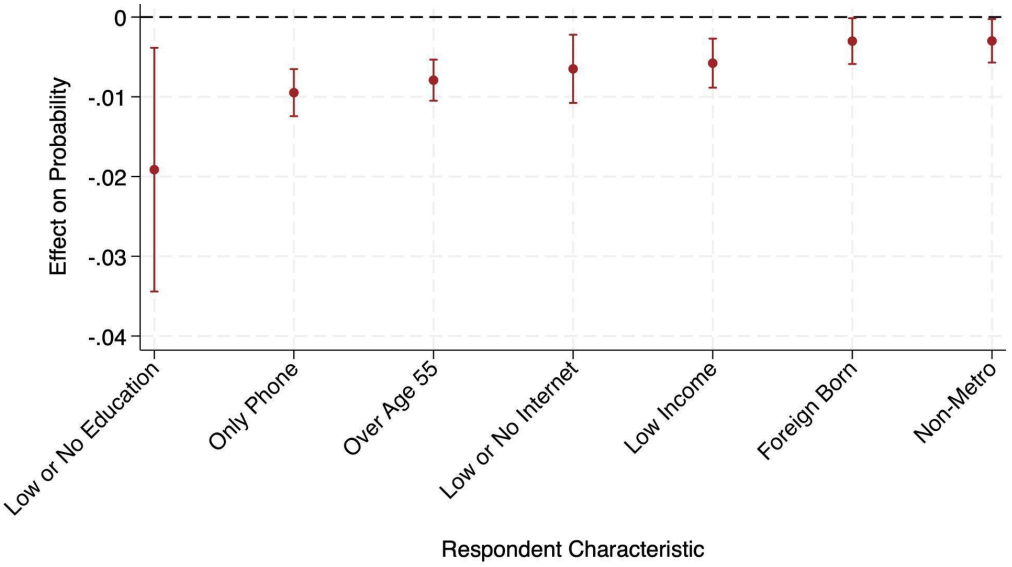


Notes: The y-axis shows the average impact of each risk factor on respondents' All Digital Skills Index score. This index is the average probability that respondents have the set of digital skills evaluated in the NTIA assessment and selected to approximate the skills evaluated in the NDIA assessment. The index ranges from a score of "0," meaning respondents do not have the skills, to "1," meaning respondents have the skills. Brackets indicate 90 percent confidence intervals. Unemployment and being female

did not produce statistically significant predictions of having all digital skills. We therefore excluded these risk factors from the figure.

Source: NTIA, 2023.

Figure D5: Risk Factors for All Digital Skills — National (Extended)



Notes: The y-axis shows the average impact of each risk factor on respondents' All Digital Skills Index score. This index is the average probability that respondents have the set of digital skills evaluated in the NTIA assessment and selected to approximate the skills evaluated in the NDIA assessment. The index ranges from a score of "0," meaning respondents do not have the skills, to "1," meaning respondents have the skills. Brackets indicate 95 percent confidence intervals. Region, unemployment, and being female did not produce statistically significant predictions of having all digital skills. We therefore excluded these risk factors from the figure.

Source: NTIA, 2023.

Appendix E: Risk Factor Analysis for Individual NDIA Digital Skills

Table E1: Risk Factors for Each NDIA Digital Skill

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
	Searching for information	**Searching for & applying for jobs**	**Accessing online banking or financial services**	**Taking a course or training materials to improve job skills**	**Accessing or applying for government services**	**Finding educational content and information**	**Using a video application, such as Zoom**	**Using a word processing application, such as Word**	Finding reliable information about a health or medical condition	Shopping online	Finding tools to keep my information safe and secure online
Low or no education	**-0.749*** **	**-0.699*** **	**-0.699*** **	**-0.728*** **	**-0.629*** **	**-0.739*** **	**-0.605*** **	**-0.731*** **	0.705***	-0.720***	0.536***
	(0.091)	**(0.104)**	**(0.107)**	**(0.106)**	**(0.108)**	**(0.105)**	**(0.108)**	**(0.110)**	(0.106)	(0.110)	(0.109)
Only phone	**-0.256*** **	**-0.190** **	**-0.248*** **	**-0.243*** **	**-0.138** **	**-0.322*** **	**-0.196** **	**-0.402*** **	-0.247***	-0.299***	-0.227**
	(0.058)	**(0.066)**	**(0.068)**	**(0.067)**	**(0.068)**	**(0.067)**	**(0.069)**	**(0.070)**	(0.067)	(0.070)	(0.070)
Low or no internet	**-0.940*** **	**-0.471*** **	**-0.513*** **	**-0.573*** **	**-0.361** **	**-0.647*** **	**-0.778*** **	**-0.526*** **	-0.556**	-0.681***	-0.461***
	(0.111)	**(0.127)**	**(0.131)**	**(0.129)**	**(0.132)**	**(0.129)**	**(0.132)**	**(0.135)**	(0.129)	(0.135)	(0.134)
Low or no English	**-0.293*** **	**-0.354*** **	**-0.394*** **	**-0.363*** **	**-0.346*** **	**-0.308*** **	**-0.406*** **	**-0.372*** **	-0.323**	-0.483***	-0.330***
	(0.062)	**(0.071)**	**(0.073)**	**(0.073)**	**(0.074)**	**(0.072)**	**(0.074)**	**(0.076)**	(0.073)	(0.076)	(0.075)
Over age 55	**-0.288** **	**-0.593*** **	**-0.319** **	**-0.472*** **	**-0.497*** **	**-0.345** **	**-0.501*** **	**-0.219**	-0.205	-0.632***	-0.409***
	(0.096)	**(0.109)**	**(0.113)**	**(0.111)**	**(0.114)**	**(0.111)**	**(0.114)**	**(0.116)**	(0.111)	(0.116)	(0.115)
Female	**-0.157** **	**-0.294*** **	**-0.244*** **	**-0.170** **	**-0.182** **	**-0.124**	**0.019**	**-0.136**	-0.077	-0.004	-0.099
	(0.057)	**(0.066)**	**(0.068)**	**(0.067)**	**(0.068)**	**(0.067)**	**(0.069)**	**(0.070)**	(0.067)	(0.070)	(0.069)
Unemployed	**-0.067**	**-0.066**	**-0.395*** **	**-0.115**	**-0.074**	**-0.155** **	**-0.126**	**-0.176** **	-0.132	-0.265***	-0.113
	(0.060)	**(0.069)**	**(0.071)**	**(0.070)**	**(0.071)**	**(0.070)**	**(0.072)**	**(0.073)**	(0.070)	(0.073)	(0.073)
Constant	**3.726*** **	**3.243*** **	**3.526*** **	**3.388*** **	**2.885*** **	**3.441*** **	**3.489*** **	**3.309*** **	3.264***	3.547***	3.002***
	(0.074)	**(0.085)**	**(0.088)**	**(0.087)**	**(0.088)**	**(0.086)**	**(0.089)**	**(0.090)**	(0.087)	(0.090)	(0.090)
N	**1018**	**1018**	**1018**	**1018**	**1018**	**1018**	**1018**	**1018**	1018	1018	1018
r2	**0.244**	**0.182**	**0.200**	**0.176**	**0.129**	**0.178**	**0.166**	**0.172**	0.145	0.211	0.117

*Notes: Standard errors are recorded in parentheses. Significance level: ***p < 0.01, **p < 0.05, *p < 0.1. Bolded columns represent digital skills included in the workforce digital skills index constructed for this analysis.*

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