

APPENDIX:
ILLINOIS STATE PROFILE

CLOSING THE DIGITAL *SKILL* DIVIDE

THE PAYOFF FOR
WORKERS, BUSINESS,
AND THE ECONOMY

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ILLINOIS

THE BIG PICTURE: UNDERSTANDING THE DEMAND FOR DIGITAL SKILLS

Illinois is the largest midwestern state by population and economic activity. There are about 12.7 million people in Illinois, and its GDP¹ was about \$950 billion in 2021. The median household income² in the state is about \$68,500. The race and ethnicity of Illinois residents closely align with the national population; roughly 62 percent of working age people are white, 13 percent are Black, 17 percent are Latinx, 6 percent are Asian American or Pacific Islander, and less than 1 percent are American Indian or Alaska Native.

Illinois has strong demand for workers with technology skills. In the Lightcast dataset of 2021 job postings used for this analysis,³ there were more than 1.7 million postings for jobs located in the state. Among those job ads, 812,000 or 47 percent, required at least one **definitely digital** skill, and 90 percent required a **definitely** or **likely digital** skill. Per this data, employers in Illinois are close to the national averages in their need for technologically skilled workers.

ZOOMING IN: DIGITAL SKILL DEMANDS DIFFER BY INDUSTRY

Foundational skills such as spreadsheets, data entry, word processing, and basic “computer literacy” are widely required across all industries in Illinois. But when it comes to more sophisticated skills, there are notable differences by sectors. For example, many Illinois job postings in the manufacturing industry require familiarity with Enterprise Resource Planning (ERP) software, while in the retail sector there is strong demand for e-commerce, point of sale systems, and robotics expertise. In finance and insurance, many employers are looking for workers with Nationwide Mortgage Licensing System (NMLS) software skills, while in accommodation and food services, familiarity with Delphi software is in regular demand. In the health care and social assistance sector, experience with electronic health records is crucial.

Knowing which digital skills are broadly in demand throughout an industry sector – or are transferrable across different industries – can help stakeholders to make wise decisions about where to invest time and resources. State policymakers and workforce and education advocates can stress-test workforce program designs against on-the-ground data from employers and job postings to ensure a clear connection between training programs’ focus and the skills workers will need on the job.

1 *Gross Domestic Product: All Industry Total in Illinois*, U.S. Bureau of Economic Analysis, retrieved from FRED, Federal Reserve Bank of St. Louis (2022)

2 *QuickFacts: Illinois*, U.S. Census Bureau (2022)

3 For more information on this dataset, see the full report: *Closing the Digital Skill Divide: The Payoff for Workers, Business, and the Economy*.

The opinions expressed in this report reflect those of the authors and do not necessarily reflect those of the Federal Reserve System or the Federal Reserve Bank of Atlanta.

ILLINOIS STATE PROFILE

The Lightcast dataset also reveals some *occupations* where demand in Illinois is especially acute. The roles highlighted in Figure 10 do not require a bachelor's degree, and therefore could be valuable opportunities for workers with more limited education who are seeking to build their digital skills and obtain higher-wage employment.

Consistent with national findings, these in-demand Illinois jobs typically require both foundational *and* industry-specific digital skills. For example, both Microsoft Excel (a foundational skill) and the more specialized accounting software QuickBooks are frequently listed in job ads for bookkeeper/accounting clerk positions.

In job postings for office or administrative assistants, basic "typing" is a highly requested skill. But these job ads also call for a range of more sophisticated skills, from SAP to Enterprise Resource Planning (ERP) to Salesforce.

FIGURE 10: Top Sub-Baccalaureate occupations in Illinois with high demand for digital skills (2021)

Occupation	Total job postings in Illinois (2021)	Subset of job postings requesting definitely digital skills	Percent of job postings requiring definitely digital skills
Data Entry Clerk	1,352	1,343	99%
Software Developer / Engineer	1,392	1,317	95%
Computer Support Specialist	2,945	2,781	94%
Bookkeeper / Accounting Clerk	4,962	4,474	90%
Office / Administrative Assistant	12,813	10,889	85%
Human Resources / Labor Relations Specialist	1,553	1,295	83%
Scheduler / Operations Coordinator	2,529	2,051	81%
Recruiter	1,989	1,584	80%
Insurance Sales Agent	1,668	1,291	77%
Radiologic Technician / Technologist	1,487	1,137	76%

Source: FRB/NSC analysis of Lightcast data.

Note: Occupations that had fewer than 1,000 total job posts in the 2021 Lightcast dataset were omitted.

Digital skills in real life: What skills look like on the job

Knowing how digital skills are showing up in the real world can help state leaders and other stakeholders to connect the dots between workforce and education investments, talent development pipelines, and business vitality. Below, selected major Illinois industry sectors are highlighted with examples.

Manufacturing

Nearly 800,000 Illinoisans work in the manufacturing sector. Manufacturing workers in Illinois are disproportionately likely to be Latino compared to the overall workforce in the state. Manufacturing workers are also more likely to have limited educational attainment – a high school diploma (or less) – more likely to live in rural areas, and more likely to have limited proficiency in English.⁴

While roles such as CNC operator or Programmable Logic Control (PLC) technician have long required some degree of digital skills, the transformation to Industry 4.0 is driving increased digital adoption in companies large and small. Manufacturing companies today are increasingly seeking workers with expertise in areas as diverse as robotics, AutoCAD, Human-Machine Interface, Computer-Aided Manufacturing (CAM), and customer relationship management (CRM) software.

One recent survey from a neighboring Midwestern state showed that the percentage of advanced manufacturing companies adopting Industry 4.0 technologies *doubled* between 2020 and 2021,⁵ a rapid rate of increase that coincided with the beginning of the Covid pandemic. In particular, the number of companies using 3D printing technology grew from 24 percent to 39 percent, and the number using collaborative robots grew from 6 percent to 22 percent.

Retail

Retail is a major industry in Illinois, employing more than 750,000 people. Retail workers in the state are disproportionately likely to be Latino or Black, compared to the overall workforce in Illinois. Retail workers are also more likely to have limited educational attainment (that is, education short of a bachelor's degree), and to be younger than the average worker.⁶

Technology demands in this sector have been steadily growing over the past two decades. One recent analysis found that the retail industry saw a sizeable jump from 2002 to 2016 in the amount of digital skills and knowledge demanded of its workforce.⁷ Roles within the retail industry require a wide variety of digital skills. Examples include inventory clerks using customized smartphone apps to categorize and process returned items; cosmetic company employees completing online learning modules to boost their digital marketing expertise; and auto technicians using computerized diagnostic tools to tackle repair jobs.

Large retailers have led the way with an exceptionally rapid pace of technological change. For example, global cosmetics giant L'Oreal has provided digital upskilling opportunities for 14,000 employees,⁸ while Walmart has rolled out a suite of digital apps that frontline workers are expected to use for activities such as price changes, processing inventory, and more.⁹

In Illinois, retailers frequently seek workers with foundational skills such as the Microsoft Office suite, as well as more specialized skills in e-commerce and virtual sales, Customer Relationship Management (CRM) applications such as Salesforce, and SAS retail analytics software.

4 FRB/NSC analysis of 2016-2020 American Community Survey data accessed via IPUMS-USA, University of Minnesota, www.ipums.org.

5 See: <https://www.conexusindiana.com/2022/01/new-study-tech-adoption-among-indiana-advanced-manufacturers-more-than-doubles-from-2020-to-2021/>

6 FRB/NSC analysis of 2016-2020 American Community Survey data accessed via IPUMS-USA, University of Minnesota, www.ipums.org.

7 https://www.brookings.edu/wp-content/uploads/2017/11/mpp_2017nov15_digitalization_full_report.pdf

8 Learn more: <https://www.loreal-finance.com/en/annual-report-2016/digital-culture>

9 Learn more: <https://corporate.walmart.com/newsroom/innovation/20180919/walmarts-custom-apps-are-enabling-a-workplace-refresh>

Healthcare

More than 900,000 workers in Illinois are employed in the healthcare sector. Compared to the overall Illinois workforce, healthcare workers are disproportionately likely to be Black or Asian American and Pacific Islander, and they are also more likely to be women and to have college degrees.¹⁰

While electronic medical records have been common in the healthcare field for more than a decade, the pandemic greatly accelerated other aspects of digital transformation across the industry. Interviews conducted by NSC have documented some common digital skill demands on the job. For example, community health workers and personal care aides often use smartphones or tablet computers to capture patient information or record their own working hours for payroll purposes. These easy-to-carry tools are especially important for healthcare workers who work in the field and do not have the desk space or permanent setup for larger computer equipment that their peers working in hospitals or nursing homes may have.

In clinics and medical offices, reception-desk workers are increasingly responsible for assisting patients in installing, using, and troubleshooting telehealth services. And even healthcare sector workers in *non-clinical* jobs have had to adapt to more digitally driven processes in procurement and compliance.

PUTTING THIS DATA TO WORK: RESOURCES FOR STATE DIGITAL EQUITY PLANNING

As noted above, states are now engaged in their federally required development of 5-year Digital Equity Act plans and 5-year Broadband Equity, Access, and Deployment (BEAD) Action Plans.

State Digital Equity Plans must describe how states will close the digital skill divide for the following populations:

- Low-income individuals;
- Aging individuals;
- Veterans;
- Individuals with disabilities;
- Individuals with English language barriers;
- Individuals with limited literacy skills;
- People of color;
- Individuals living in rural areas; and
- Individuals currently incarcerated (in non-federal correctional facilities).

In this section, we highlight data sources that states can use to better understand each population. By juxtaposing this Census Bureau American Community Survey with our Lightcast findings, states can better identify where to focus their digital skill-building investments.

Low-income individuals

As described in the full *Closing the Digital Skill Divide* report, low income individuals face significant challenges in building their digital skills and are disproportionately likely to lack such skills.

Twelve percent of Illinoisans live in households that are at or below 150 percent of the poverty line. That figure is even higher for the subset of individuals working¹¹ in certain industries. For example, it rises to 22 percent for workers in the accommodation and food services sector, 21 percent for workers in the

10 FRB/NSC analysis of 2016-2020 American Community Survey data accessed via IPUMS-USA, University of Minnesota, www.ipums.org.

11 For individuals who are not currently working, the data reflect the industry in which they were most recently employed.

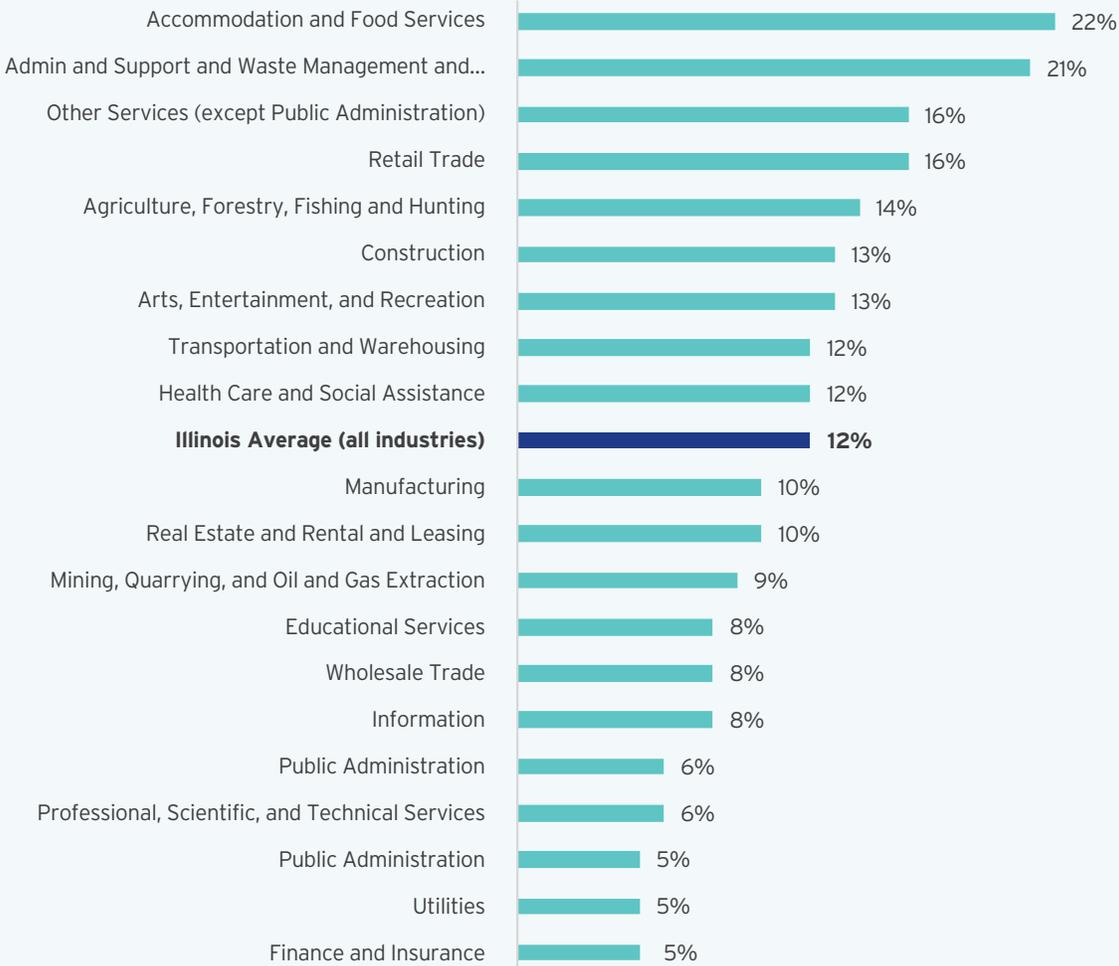
ILLINOIS STATE PROFILE

administrative and support and waste management and remediation services, and 13 percent for individuals in the construction sector.

This data is particularly notable because there is strong demand for workers with digital skills in these industries: Nationwide, 23 percent of accommodation and food services, 49 percent of administrative and support and waste management, and 39 percent of construction job postings required at least one *definitely digital* skill.

This demand data helps illustrate that Illinois has multiple reasons to invest in these workers: To support their individual economic mobility; to meet federal Digital Equity Act requirements for reducing inequities; and finally, to ensure that Illinois businesses in key industries have access to a competitive talent pool that is equipped with necessary technological skills.

FIGURE 11: Percent of Illinoisans aged 16-64 living in low income households, by Industry of Employment



Source: FRB/NSC analysis of 2016-2020 American Community Survey data accessed via IPUMS-USA, University of Minnesota, www.ipums.org

Aging individuals

In general, aging populations have slightly lower levels of digital skills than younger populations,¹² so they should also be considered when developing community-centric programs. Focusing on digital skills solely during K-12 education is insufficient. Adult workers need timely, relevant education and workforce development opportunities at mid career and even later in their working years, as their jobs continue to change beneath their feet.

In Illinois, 9 percent of working age individuals are aged between sixty and sixty-four. The agriculture, forestry, fishing and hunting sector and the utilities industry have disproportionate numbers of older workers.

FIGURE 12: Percent of Illinoisans aged 60-64, by Industry of Employment

Industry	% Working age adults 60 or above
Agriculture, Forestry, Fishing and Hunting	14%
Utilities	12%
Real Estate and Rental and Leasing	12%
Public Administration	11%
Manufacturing	10%
Mining, Quarrying, and Oil and Gas Extraction	10%
Wholesale Trade	10%
Health Care and Social Assistance	10%
Other Services (except Public Administration)	10%
Educational Services	9%
Transportation and Warehousing	9%
Information	9%
Construction	9%
Management of Companies and Enterprises	9%
Illinois Average (all industries)	9%
Finance and Insurance	9%
Admin and Support and Waste Management and Remediation Services	8%
Professional, Scientific, and Technical Services	8%
Retail Trade	7%
Arts, Entertainment, and Recreation	6%
Accommodation and Food Services	3%

Source: FRB/NSC analysis of 2016-2020 American Community Survey data accessed via IPUMS-USA, University of Minnesota, www.ipums.org

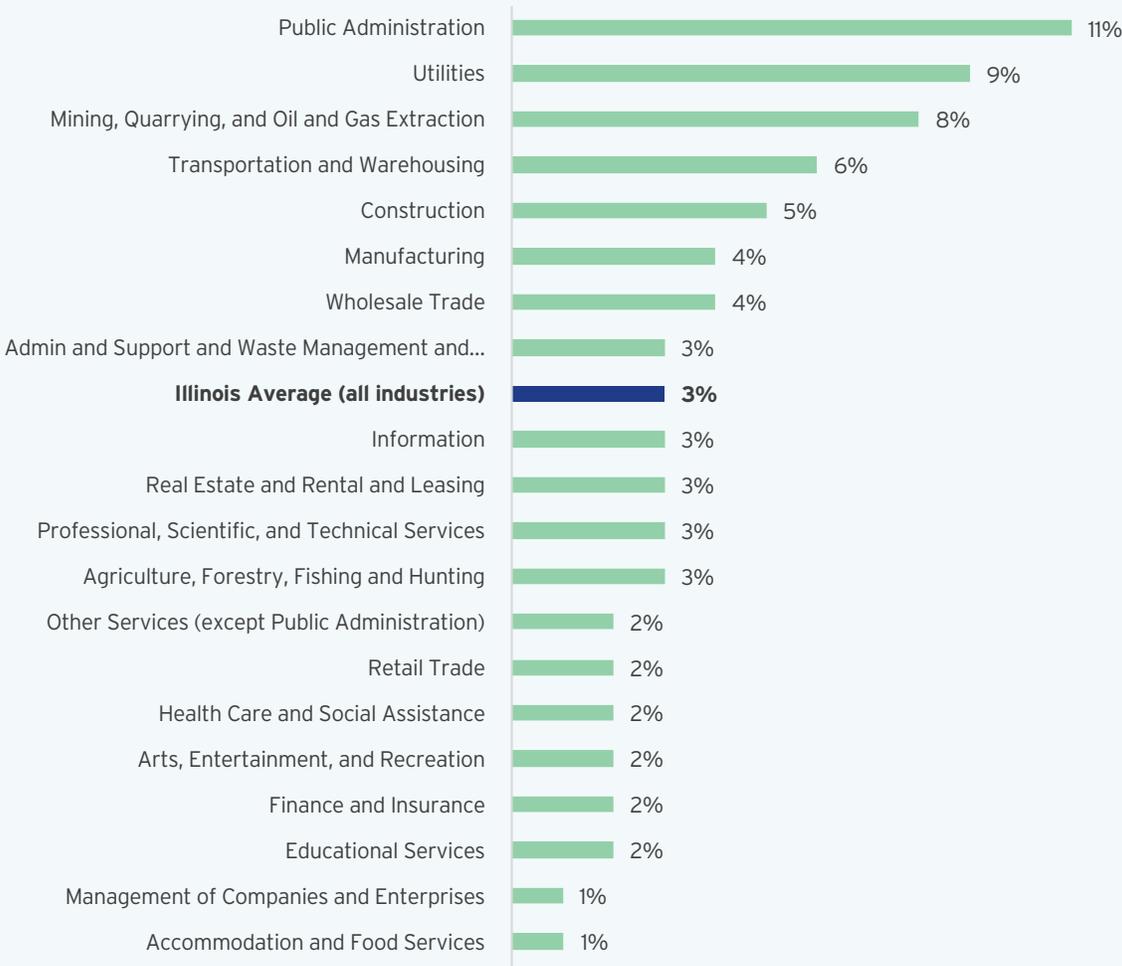
¹² *The New Landscape of Digital Literacy* (National Skills Coalition, 2020.)

Veterans

Veterans are a critical group for states to consider when developing their Digital Equity Plans. Some veterans have acquired technology skills through their former military jobs, while others need opportunities to upskill or reskill into civilian occupations that require such skills.

There are roughly 220,000 veterans¹³ aged 16-64 living in Illinois. Overall, military veterans comprise 3 percent of working age Illinoisans. However, some industries have substantially greater concentrations. For example, roughly 11 percent of public administration workers are veterans. The utilities and the mining, quarrying, and oil and gas extraction sectors also have a disproportionately high percentage of veterans, at 9 percent and 8 percent of their workforce, respectively.

FIGURE 13: Percent of veterans among all Illinois workers 16-64, by Industry of Employment



Source: FRB/NSC analysis of 2016-2020 American Community Survey data accessed via IPUMS-USA, University of Minnesota, www.ipums.org

¹³ For this analysis, veterans were only included if they are currently in or have worked in industries outside of the military after their service was completed.

Individuals living with disabilities

While often thought of as a group that *lacks* digital skills, individuals living with one or more disabilities are often on the cutting edge of technology adoption through necessity. For example, people with visual disabilities have long been accustomed to using screen readers, voice-to-text software, and other devices to enable them to participate equitably in the online world. People with disabilities have also been leaders in developing new technologies that are widely used by people of all backgrounds, such as automatic captioning for online videos.¹⁴

However, workers with disabilities also face significant barriers in seeking and maintaining employment. States seeking to close equity gaps among this population should work directly with disability advocates to better understand the unique capabilities and particular challenges facing these workers.

The Census Bureau American Community Survey collects disability data across five categories of individuals, including those who face:

- **Cognitive difficulty:** An individual that has difficulty remembering, concentrating, or making decisions because of a physical, mental, or emotional problem.
- **Ambulatory difficulty:** An individual that has serious difficulty walking or climbing stairs.
- **Independent living difficulty:** An individual that has difficulty doing errands alone such as visiting a doctor's office or shopping because of a physical, mental, or emotional problem.
- **Self-care difficulty:** An individual having difficulty bathing or dressing.
- **Vision or hearing difficulty:** Conditions that include blindness, deafness, or a severe vision or hearing impairment.

Overall, 6 percent of working age Illinois residents have a disability. As shown in Figure 5, the admin and support and waste management and remediation services industry; the mining, quarrying, and oil and gas extraction industry; and retail trade industry have a higher-than-average percentage of workers with disabilities.

¹⁴ For example, see: <https://www.npr.org/templates/story/story.php?storyId=124501330> and <https://news.microsoft.com/features/people-disabilities-using-improving-accessible-technology/>

FIGURE 14: Percent of Illinoisans aged 16-64 living with a disability, by Industry of Employment

Industry	Percent with a disability
Admin and Support and Waste Management and Remediation Services	8%
Mining, Quarrying, and Oil and Gas Extraction	7%
Public Administration	7%
Retail Trade	7%
Accommodation and Food Services	6%
Health Care and Social Assistance	6%
Manufacturing	6%
Transportation and Warehousing	6%
Agriculture, Forestry, Fishing and Hunting	6%
Utilities	6%
Construction	6%
Other Services (except Public Administration)	6%
Illinois Average (all industries)	6%
Arts, Entertainment, and Recreation	6%
Real Estate and Rental and Leasing	6%
Wholesale Trade	5%
Management of Companies and Enterprises	5%
Information	5%
Educational Services	5%
Professional, Scientific, and Technical Services	4%
Finance and Insurance	3%

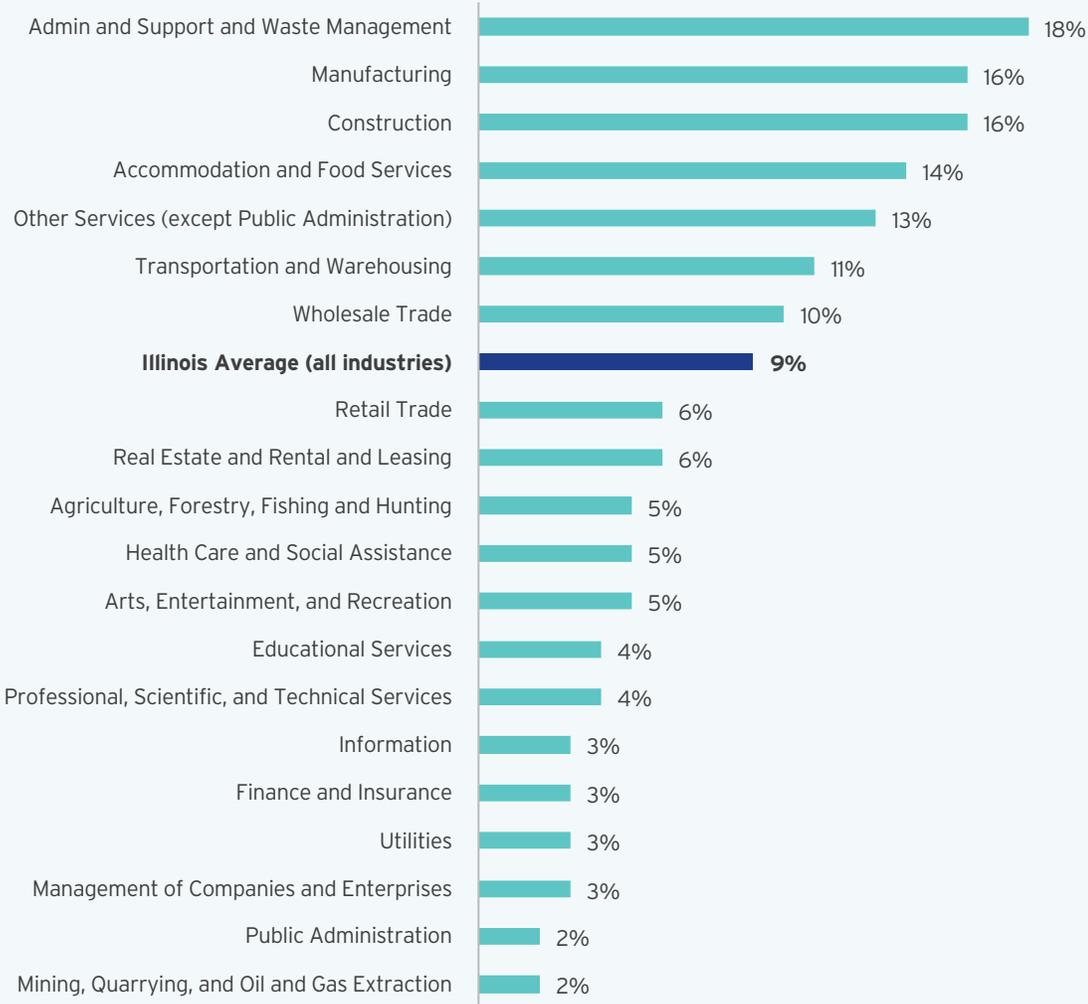
Source: FRB/NSC analysis of 2016-2020 American Community Survey data accessed via IPUMS-USA, University of Minnesota, www.ipums.org

Individuals with English language barriers

While some immigrants and adult English learners have robust digital skills, others need opportunities to develop those skills. Overall, at the national level, immigrants and adult English learners are more likely to lack digital skills, compared to white native-born Americans.¹⁵ As states seek to identify effective tools to help their constituents navigate and acquire digital skills, English language learning models that include strong digital literacy components will be an important part of the solution.¹⁶

In Illinois, the admin and support and waste management and remediation services; construction; and accommodation and food services industries have a disproportionate number of workers who have English language barriers.

FIGURE 15: Percent of Illinoisans aged 16-64 with English language barriers, by Industry of Employment



Source: FRB/NSC analysis of 2016-2020 American Community Survey data accessed via IPUMS-USA, University of Minnesota, www.ipums.org

15 For more information on this topic, see NSC’s fact sheet on Applying a Racial Equity Lens to Digital Literacy: <https://nationalskillscoalition.org/wp-content/uploads/2020/12/Digital-Skills-Racial-Equity-Final.pdf>.

16 For more information on this topic, see NSC’s Amplifying Impact report: <https://nationalskillscoalition.org/wp-content/uploads/2020/12/06-25-2020-NSC-Amplifying-Impact.pdf>

Individuals with limited literacy skills

Across Illinois, thousands of workers with limited literacy skills are holding down jobs across many different industries. Employed in retail shops and restaurants, hotels and hospitals, and manufacturing jobs, among many others, these workers not only help fuel the country's economy – they keep daily life in America humming smoothly along.

Due in large measure to structural forces in American society, digital skill gaps are closely correlated to limited literacy skills. As states identify tools to help these constituents and mitigate digital equity gaps, it's important that they understand the particular challenges facing these workers.

In the full *Closing the Digital Skill Divide* report, our findings point to the need to invest in workers with limited formal education. Policymakers should be clear that these workers, who are often employed in entry-level jobs, need the same access to digital skill-building opportunities that their more-educated peers expect and receive.

While the The Census Bureau American Community Survey does not specifically gather data on literacy skills, it does include educational attainment data, so we've used educational attainment of lower than a high school diploma as a proxy. In Illinois, the accommodation and food services; arts, entertainment, and recreation; and manufacturing industries are among those with a disproportionate number of workers with this limited educational attainment (and thus likely limited literacy skills¹⁷).

FIGURE 16: Percent of Illinoisans aged 16-64 with limited literacy skills, by Industry of Employment

Industry	Percent with literacy barriers
Accommodation and Food Services	24%
Admin and Support and Waste Management and Remediation Services	18%
Arts, Entertainment, and Recreation	18%
Construction	16%
Agriculture, Forestry, Fishing and Hunting	14%
Manufacturing	13%
Other Services (except Public Administration)	11%
Retail Trade	10%
Mining, Quarrying, and Oil and Gas Extraction	10%
Illinois Average (all industries)	9%
Wholesale Trade	9%
Transportation and Warehousing	9%
Real Estate and Rental and Leasing	5%
Health Care and Social Assistance	4%
Information	4%
Educational Services	3%
Public Administration	3%
Utilities	2%
Management of Companies and Enterprises	2%
Professional, Scientific, and Technical Services	1%
Finance and Insurance	1%

Source: FRB/NSC analysis of 2016-2020 American Community Survey data accessed via IPUMS-USA, University of Minnesota, www.ipums.org

¹⁷ *The New Landscape of Digital Literacy* (National Skills Coalition, 2020) and *Foundational Skills in the Service Sector* (National Skills Coalition, 2018).

People of color

While many workers facing a digital skill divide are white, people of color are disproportionately affected.¹⁸ The ripple effects of historical policies and structural racism continue to contribute to modern-day inequities in digital skills and access to them. From digital redlining that limits the availability of high-speed internet in some communities, to under-funded educational institutions unable to provide their students with robust digital technologies for learning, barriers to access often limit workers' ability to build digital skills and businesses' ability to advance into the digital age. These wide-ranging effects emphasize the vital role of public policy in remedying inequities caused by prior policies.

As states identify ways to target their Digital Equity Act investments to reduce racial inequities, understanding which industries have especially high concentrations of workers of color can point the way.

In Illinois, Black workers (who represent 13% of working-age state residents overall) are disproportionately concentrated in the transportation and warehousing (24%); admin and support and waste management and remediation services (19%); and public administration (19%) industries.

Workers of Hispanic or Latino origin (who represent 17% of working-age state residents) are disproportionately concentrated in the admin and support and waste management and remediation services (29%); accommodation and food services (28%); and manufacturing (24%) industries.

Asian American and Pacific Islander workers (who represent 6% of working-age state residents) are disproportionately concentrated in the professional, scientific, and technical services management of companies and enterprises (12%); health care and social assistance (9%); and finance and insurance (8%) industries.

American Indian or Alaska Native people (who represent 0.1% of working-age state residents) are disproportionately concentrated in the mining, quarrying, and oil and gas extraction (0.2%) industry.

When looking at the intersection of race and gender, Black women in Illinois (who represent 7% of working-age residents) are more likely to be in health care and social assistance (15% of health care workers); Black men (6% of working-age state residents) in transportation and warehousing (15%); Latinas (8% of working-age state residents) in accommodation and food services (13%); and Latinos (9% of working-age state residents) in construction (22%).

Asian women (3% of working-age state residents) are over-represented in the health care and social assistance (6%) industry sector; Asian men (3% of working-age state residents) are more concentrated in professional, scientific, and technical services (8%); American Indian or Alaska Native women (0.05% of working-age state residents) in mining, quarrying, and oil and gas extraction (0.16%); and American Indian or Alaska Native men (0.04% of working-age state residents) in utilities (0.14%) sectors.

Notably, many of these industries also employ significant numbers of other "covered populations", making them particularly appealing areas for state policymakers to target.

Closing equity gaps can catapult both workers and businesses to greater economic success. As this data on occupational segregation highlights, many marginalized workers are clustered in industries that have rapidly growing demand for technological skills. As a result, both workers themselves and the companies that employ them can flourish if given the opportunity for upskilling.

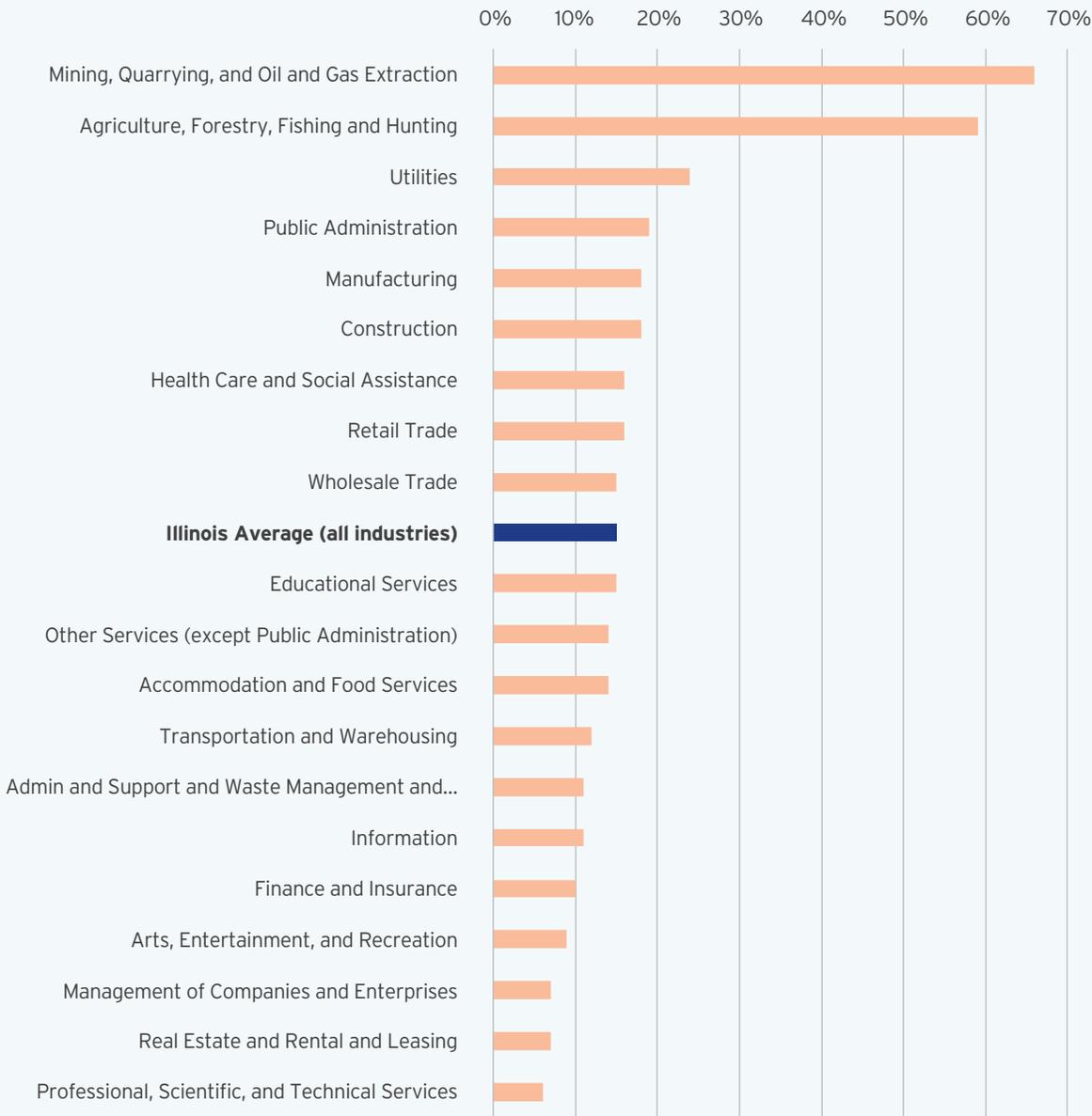
¹⁸ For more information on this topic, see NSC's fact sheet on Applying a Racial Equity Lens to Digital Literacy: <https://nationalskillscoalition.org/wp-content/uploads/2020/12/Digital-Skills-Racial-Equity-Final.pdf>.

Individuals living in rural areas

Individuals in rural communities face compounded challenges – they are more likely to lack broadband internet access due to their geographic location, and this lack of access then hampers their ability to get online and build better digital skills by participating in educational and workforce opportunities. Tackling these issues is crucial to ensure an even playing field for individuals in rural areas.

The Census Bureau’s ACS data does not directly tell us whether someone resides in a rural or an urban area. However, it does provide information on whether someone is located in a metropolitan area, not in a metro area, or if their approximate location is “on the fence” (i.e., mixed). In Illinois, the mining, quarrying, and oil and gas extraction, and agriculture, forestry, fishing and hunting industries have disproportionate percentages of workers located in non-metro or mixed areas.

FIGURE 17: Percent of Illinoisans aged 16-64 who reside in non-metro or mixed areas, by Industry of Employment



Source: FRB/NSC analysis of 2016-2020 American Community Survey data accessed via IPUMS-USA, University of Minnesota, www.ipums.org

ILLINOIS STATE PROFILE

In addition, 22 percent of American Indian or Alaska Natives (AIAN) in Illinois live in non-metro or mixed areas, significantly above the 15 percent average for all Illinois residents and the 19 percent average for the United States. In the industries that disproportionately employ AIAN Illinois residents – mining, quarrying, and oil and gas extraction and utilities – 66 percent and 24 percent, respectively, of the American Indians and Alaska Natives in those jobs reside in non-metro or mixed areas.

Individuals who are currently incarcerated

People who are incarcerated (in non-federal institutions) are another “covered population” under the Digital Equity Act. These individuals face particular challenges in building digital skills while behind bars. Correctional education programs may restrict or even prohibit the use of digital technology or internet access, which puts justice-involved people at a disadvantage when reentering society.

The Sentencing Project, a nonprofit organization, found that in Illinois, there are more than 46,000 people incarcerated in prisons in jails.¹⁹ Black people are imprisoned almost eight times the rate of white people, and Latinos are imprisoned at 1.5 times the rate of white people. Removing technology and internet restrictions, and providing meaningful opportunities for incarcerated people to build digital skills, can allow individuals to prepare effectively for life and employment after release.²⁰

¹⁹ *U.S. Criminal Justice Data*, The Sentencing Project (2022)

²⁰ *Building the Technology Ecosystem for Correctional Education: Brief and Discussion Guide* <https://lincs.ed.gov/sites/default/files/tech-ecosystem-correctional-ed.pdf>, (U.S. Department of Education, 2022.)