Closing the Digital **Skill** Divide: The Payoff for Workers, Business, and the Economy

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Federal Reserve Bank
Digital Inclusion Research Forum

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Center for Workforce & Economic Opportunity
The Federal Reserve

Responsible for monetary policy, supervision and regulation of banks, and payment systems.

The Dual Mandate
1. Stable Prices
2. Maximum Employment
   a. Community Development
The digital divide isn’t just about broadband or hardware – it’s also about skills.
Higher digital skills are correlated with higher broadband adoption rates.
People often enroll in digital skills classes to get a job or get a better job.
So we decided to research employers’ demand for digital skills.
We analyzed 43 million job ads from 2021

• The average ad sought **8 skills**

• Data was initially collected and standardized by Lightcast

• Further analysis was carried out by NSC in collaboration with the Federal Reserve Bank of Atlanta

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Virtually All Jobs Require Digital Skills…

**92%** of jobs in U.S. require definitely digital or likely digital skills

**47%** of jobs require definitely digital skills

**45%** of jobs require likely digital skills

**8%** of jobs require no digital skills

Based on analysis of 43 million online job ads from 2021 Lightcast data.

**Definitely Digital** | **Likely Digital** | **Not Digital**
---|---|---
Microsoft Office | Scheduling | Self-Starter
Computer Literacy | Teaching | Problem Solving
Salesforce | Patient Care | Creativity
Information Security | Inventory Management | Leadership
Machine Learning | Key Performance Indicators (KPIs) | Cardiopulmonary Resuscitation (CPR)

How were skills categorized?
15,000 distinct skills in the 2021 Lightcast data. Authors manually coded the top half (7,500), which accounted for 99.99% of job postings.

National data. For details, see full report: *Closing the Digital Skill Divide* (National Skills Coalition, 2023.)
Demand for Digital Skills is Saturated Across U.S.

Demand for Digital Skills by State

Percent of online job postings

National data. For details, see full report: Closing the Digital Skill Divide (National Skills Coalition, 2023.)
### Demand for Digital Skills by Industry

Percent of online job postings

<table>
<thead>
<tr>
<th>Industry</th>
<th>Demand</th>
</tr>
</thead>
<tbody>
<tr>
<td>Information</td>
<td>99%</td>
</tr>
<tr>
<td>Educational Services</td>
<td>96%</td>
</tr>
<tr>
<td>Retail Trade</td>
<td>95%</td>
</tr>
<tr>
<td>Real Estate and Rental and Leasing</td>
<td>94%</td>
</tr>
<tr>
<td>Finance and Insurance</td>
<td>99%</td>
</tr>
<tr>
<td>Public Administration</td>
<td>96%</td>
</tr>
<tr>
<td>Wholesale Trade</td>
<td>95%</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>93%</td>
</tr>
<tr>
<td>Professional, Scientific, and Technical</td>
<td>98%</td>
</tr>
<tr>
<td>Services of Companies and Enterprises</td>
<td>96%</td>
</tr>
<tr>
<td>Health Care and Social Assistance</td>
<td>95%</td>
</tr>
<tr>
<td>Mining, Quarrying, and Oil and Gas Extraction</td>
<td>92%</td>
</tr>
<tr>
<td>Utilities</td>
<td>91%</td>
</tr>
<tr>
<td>Construction</td>
<td>91%</td>
</tr>
<tr>
<td>Arts, Entertainment, and Recreation</td>
<td>90%</td>
</tr>
<tr>
<td>Administrative and Support and Waste</td>
<td>89%</td>
</tr>
<tr>
<td>Management and Remediation Services</td>
<td>89%</td>
</tr>
<tr>
<td>Other Services</td>
<td>86%</td>
</tr>
<tr>
<td>Accommodation and Food Services</td>
<td>85%</td>
</tr>
<tr>
<td>Agriculture, Forestry, Fishing and Hunting</td>
<td>86%</td>
</tr>
<tr>
<td>Transportation and Warehousing</td>
<td>77%</td>
</tr>
</tbody>
</table>

National data. For details, see full report: [Closing the Digital Skill Divide](National Skills Coalition, 2023.)
Digital Literacy is a Building Block for Job Access…
Yet 1/3 workers lack basic digital literacy

Source: The New Landscape of Digital Literacy (National Skills Coalition, 2020.)
Connecting to Netflix != Digital Literacy
Jobs Are More Digital Than We Realize…
and Digitalization is Only Increasing
Healthcare Workers Need Digital Skills

Charting/Patient Tracking

Medical Devices
Restaurant Staff Need Digital Skills

Mobile Devices

Inventory Management
Food processing plant workers need digital skills.
Construction workers need to use mobile apps to submit work-order changes.
Agriculture workers need to use in-cab tractor technology.
Non-Tech Workers Who Work with Robots Need Digital Skills

Telsa Factory

Amazon Distribution Center
Aerospace workers need to use augmented reality to assemble aircraft engines.
The bottom line: Even entry-level positions now require digital skills.
Jobs that require very little work experience still need digital skills

<table>
<thead>
<tr>
<th>Amount of work experience required</th>
<th>Percentage of job ads requiring likely digital skill</th>
<th>Percentage of job ads requiring definitely digital skill</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-2 years</td>
<td>95%</td>
<td>49%</td>
</tr>
<tr>
<td>3-5 years</td>
<td>98%</td>
<td>71%</td>
</tr>
<tr>
<td>6-8 years</td>
<td>99%</td>
<td>81%</td>
</tr>
<tr>
<td>9+ years</td>
<td>98%</td>
<td>75%</td>
</tr>
</tbody>
</table>

National data. For details, see full report: Closing the Digital Skill Divide (National Skills Coalition, 2023.)
Jobs that require limited education nevertheless need digital skills

<table>
<thead>
<tr>
<th>Educational credential required</th>
<th>Percentage of job ads requiring likely digital skill</th>
<th>Percentage of job ads requiring definitely digital skill</th>
</tr>
</thead>
<tbody>
<tr>
<td>High school diploma</td>
<td>94%</td>
<td>46%</td>
</tr>
<tr>
<td>Associate’s degree</td>
<td>97%</td>
<td>47%</td>
</tr>
<tr>
<td>Bachelor’s degree</td>
<td>99%</td>
<td>74%</td>
</tr>
<tr>
<td>Master’s degree</td>
<td>97%</td>
<td>46%</td>
</tr>
<tr>
<td>Ph.D.</td>
<td>97%</td>
<td>39%</td>
</tr>
</tbody>
</table>

National data. For details, see full report: *Closing the Digital Skill Divide* (National Skills Coalition, 2023.)
Counter-intuitive but true:
Younger workers need to develop digital skills too!
Workers Earn More…
When they acquire more digital skills
National Median Hourly Earnings

<table>
<thead>
<tr>
<th>Digital Skills</th>
<th>Earnings</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Digital Skills</td>
<td>$17.62</td>
</tr>
<tr>
<td>All Jobs</td>
<td>$19.05</td>
</tr>
<tr>
<td>At Least 1 Definitely Digital Skill</td>
<td>$21.64</td>
</tr>
<tr>
<td>At Least 3 Definitely Digital Skills</td>
<td>$25.50</td>
</tr>
<tr>
<td>At Least 5 Definitely Digital Skills</td>
<td>$30.58</td>
</tr>
<tr>
<td>At Least 7 Definitely Digital Skills</td>
<td>$37.92</td>
</tr>
<tr>
<td>At Least 9 Definitely Digital Skills</td>
<td>$43.00</td>
</tr>
</tbody>
</table>

▲ 23%: No Digital Skills to One
▲ 41%: One Digital Skill to Five
▲ 41%: Five Digital Skills to Nine
▲ 144%: No Digital Skills to Nine

National data. For details, see full report: Closing the Digital Skill Divide (National Skills Coalition, 2023.)
Higher pay leads to greater vitality in the broader economy

- Workers who earn higher wages by moving to a job that requires one digital skill will typically *contribute more* in federal and state tax revenue

- Depending on the household size and composition, this amount could range from $1,363 to $2,879 per year.

Small businesses also need workers with digital skills

<table>
<thead>
<tr>
<th>Businesses posting 1-50 job ads per year</th>
<th>Job ads requiring a likely digital skill</th>
<th>Job ads requiring a definitely digital skill</th>
</tr>
</thead>
<tbody>
<tr>
<td>Businesses posting 501-1,000 job ads per year</td>
<td>90%</td>
<td>94%</td>
</tr>
<tr>
<td></td>
<td>44%</td>
<td>52%</td>
</tr>
</tbody>
</table>

Note: National data. For details, see full report: *Closing the Digital Skill Divide* (National Skills Coalition, 2023.) The dataset used for this analysis does not directly measure the size of a company, so we inferred firm size based on the volume of job ads posted by the company in a year.
There is robust demand for industry-specific digital skills

Job ads requiring industry-specific digital skills (either alone or in combination with foundational skills)

- HS diploma: 43%
- Associate degree: 68%
- Bachelor degree or above: 80%

Note: Numbers reflect percentage of jobs requiring an industry-specific digital skill within the subset of jobs that require at least one definitely digital skill. Percentages would be even higher if including jobs with only likely digital skills.
Specialty Skills Pay Even More

Workers Earn More...
When they acquire industry/occupation specific digital skills

National Median Hourly Earnings

Source: Presenter’s analysis of Lightcast data. For details, see full report: *Closing the Digital Skill Divide* (National Skills Coalition, 2023.)
Employers Pay a Premium for Specialty Skills

Most Demanded Specialty Skills
By Skill Type and Pay
National Median Annual Earnings for Jobs Requesting Skill

Foundational Skills
- Point of Sale System
- Typing Data Entry
- Basic Internet Skills
- Email Marketing
- Microsoft Outlook
- Microsoft Word
- Online Research
- Social Media
- Computer Literacy
- Data Entry

Specialty Skills
- Microsoft Powerpoint
- Email Marketing
- Microsoft Excel
- Microsoft Word
- Machine Learning
- Software Development
- Digital Marketing
- Data Analysis
- Salesforce
- Quickbooks
- Electronic Medical Records
- Data Science
- Python
- Information Security
- SQL
- Tableau

National data. For details, see full report: Closing the Digital Skill Divide (National Skills Coalition, 2023.)
What do these findings mean for digital inclusion researchers, in light of new federal Digital Equity funds?
Researchers can use this data as a signpost to guide policy implementation and a jumping-off point for further exploration:
1. Conduct qualitative research to understand how workers are experiencing the demand for digital skills in their communities.
2. Combine these findings with Census data to target services and close equity gaps for covered populations.
3. Use data to inform the design of Digital Equity Act and BEAD programs in digital skills and broadband workforce development.
4. Gather additional data from employers about how better digital skills can lead to promotion and advancement.
5. Partner with higher education to document student, faculty, and staff members’ digital skill assets and barriers.
6. Explore opportunities to juxtapose digital skills data with other research to understand race and gender disparities.
Time for your questions!
Full report: 
Closing the Digital Skill Divide

https://tinyurl.com/DigitalSkillDivide
Knowledge to action: Additional resources

- NSC’s experienced policy staff can help researchers and digital inclusion advocates identify **policy possibilities**

- NSC’s Digital Equity Act and BEAD **recommendations** (see **right**) may also be helpful
Other NSC digital skills data resources

- Applying a Racial Equity Lens to Digital Literacy (fact sheet)
- Digital skills fact sheets by industry:
  - Manufacturing
  - Retail & hospitality
  - Health & social work
  - Construction, transportation & storage

Full report: www.tinyurl.com/BoostingDL
The New Landscape of Digital Literacy

How workers’ uneven digital skills affect economic mobility and business competitiveness, and what policymakers can do about it.

Full charts and graphs in this data report: tinyurl.com/NewLandsDL