# NORTH DAKOTA FOUNDATIONAL DIGITAL LITERACY **RESEARCH AND RECOMMENDATIONS**

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Dakota | Commerce Be Legendary.

## STATE TEAM

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## EXECUTIVE SUMMARY

North Dakota possesses a once in a generation chance to transform its workforce through the enhancement of digital skills in the workforce. The COVID-19 pandemic accelerated the transformation of the workplace to include remote and hybrid settings making digital skills more important for many occupations and vital for some. The Digital Equity Act, passed in 2021 with bipartisan support, is an expansive initiative. The Act recognizes the necessity of digital skills in nearly all jobs and seeks to provide training and education to various population groups, improve online accessibility of social services for individuals with disabilities, and empower rural communities. In response to these opportunities and with the assistance of a National Governors Association, the team engaged in preliminary investigation of covered populations, internet access, digital skills and workforce, all necessary for optimal use of program dollars under the Digital Equity Act.

The realities of the new work environment led the team to craft an overarching vision for digital literacy in North Dakota:

All North Dakotans will have equitable access to opportunities to develop digital skills to meet the needs of North Dakota's 21<sup>st</sup> century workforce.

The team gathered data related to digital skills, population, and employment in North Dakota to craft recommendations about how to develop and expand digital skills in North Dakota while making training opportunities equitable for all groups.

Using the available data, the team studied various aspects of populations in North Dakota, the issues related to internet access, digital skill gaps among adult learners and job seekers, and the potential return on investment for increasing digital skills. After examining the data, the team arrived at the following conclusions:

- Over 95% of North Dakota households have access to broadband internet connection.
- Digital skills required for most occupations increased over time.
- The "in-demand" jobs on the Job Service website have higher average digital skills requirements than the average for all occupations.
- Higher levels of digital skills in occupations in North Dakota are associated with higher incomes.
- Changing to an occupation requiring higher levels of digital skills can increase annual income by an average of just under \$660 per year.
- The team recommends the following:
- Hiring and appointment of an individual with responsibilities for overseeing the state's digital equity efforts, aligning partners, and resulting policy including collection and analysis of data related to program effectiveness.
- Creation of a taskforce/working group to assist the digital equity director.
- Providing professional development for individuals who serve adults lacking digital skills, including staff in job centers, adult learning centers, libraries, tribal colleges, and more.
- Complete an inventory of programs and state assets available to partner with the digital equity director.

The document contains the information used to support these recommendations. This includes an introduction, definitions of key terms used, discussions of internet access and labor market circumstances, digital skills data, and the possible return on investment to increases in digital skills. The team then discusses the need for more and better data about the state of digital skill development in the state of North Dakota. There is a discussion of the current data and a pilot survey undertaken during the development of this recommendation. There is then a discussion of the data around the populations covered by the Digital Equity Act and how those groups fit with the recommendation of this group.

## INTRODUCTION

Since being elected in 2016, Governor Burgum has been committed to transforming education in North Dakota while prioritizing the development of a 21st century workforce. This is demonstrated through his Five Strategic Initiatives, and addressed through both the Transforming Education and Main Street Initiative pillars. North Dakota is in the process of finalizing a pre-kindergarten through workforce (PK-20W) state plan for computer science and cybersecurity education to create a pipeline of future workers who have the skills necessary to excel in a global, digital economy, regardless of industry. Equipping our students for today's jobs is important; however, it is equally important that adult workers and job seekers do not get left behind. Given the shortage of workers we have in our state, we simply cannot afford to lose these individuals in the workforce. North Dakota is continuously working to diversify our economy and there is a mismatch in the skillsets of some of job seekers and opportunities in a variety of industries including energy, agriculture, health care, unmanned aircraft systems (UAS), biotech, cybersecurity, manufacturing, and engineering.

According to North Dakota's digital scorecard, 32.9% of unemployed individuals lack foundational digital skills which are required for 72.7% of open jobs in the state. Job Service North Dakota (JSND) job center staff reinforce this statistic with anecdotal examples of clients not knowing how to navigate the internet or not knowing how to use software such as Microsoft Word to create a resume, and struggle to understand how to apply for jobs online. This problem becomes more challenging to address in rural areas and in minority populations.

Fortunately, North Dakota is well positioned to take on the task of developing a comprehensive state plan to promote digital skill literacy as the state ranks #1 in the country for providing high-speed fiber optic access (USDA Rural Development) and telecommunications providers continue to rollout advancements in broadband connectivity, speed, and affordability. This leadership in broadband access has created an environment that is ready to support workers and job seekers as they prepare for 21st century jobs in our state.

To start the work of writing a digital equity plan, North Dakota joined five other states in the National Governors Association Workforce Innovation Network, which provided technical assistance and access to experts who shared their expertise as it relates to digital skill literacy, broadband, and more; all in an effort to prepare states for the passage of the Digital Equity Act which requires that states develop a plan for digital equity throughout the 2022-2023 year. North Dakota's goals for this project were to gather data on digital skill gaps and digital skill needs in the state; develop the foundation for a state plan that leverages public and private sector partnership, and policy strategies to increase digital skill literacy for adults throughout the state, especially those in rural areas and tribal communities.

Throughout the project period, the state team accomplished the following milestones:

- Crafted a vision that all North Dakotans will have equitable access to opportunities to develop digital skills to meet the needs of North Dakota's 21st century workforce.
- Developed a glossary of terms related to digital equity to help a created shared language for future program partners, stakeholders, legislators, and others (Appendix A and immediately after this introduction).
- Identified digital skills required for in-demand jobs that do not require a bachelor's degree or higher and leveraged partners at Microsoft to categorize skills as basic, intermediate, and advanced digital skills (Appendix B).
- Created a digital asset map that highlights existing digital skill training opportunities and resources for adult workers and job seekers (Appendix C).
- Calculated the return on investment for individuals who advance their digital skills.

Although work will be ongoing, this state plan is designed to serve as a foundation for a comprehensive digital equity plan that will be developed throughout the next year. The project team is comprised of individuals from across state government and the private sector whose efforts will give North Dakota a head start in advancing digital skill training for adult job seekers and workers throughout the state.

Members of North Dakota's team include:

- Phil Davis, Workforce Services Director, Job Service North Dakota
- Katie Ralston Howe, Workforce Development Director, North Dakota Department of Commerce
- Maria Neset, Policy Advisor, Office of the Governor
- Sara Mitzel, Adult Education Program Manager, North Dakota Department of Public Instruction
- Taya Spelhaug, TechSpark Manager North Dakota, Microsoft Philanthropies & member, Workforce Development Council
- Contracted services provided by David Flynn, Research Director, University of North Dakota Institute of Policy & Business Analytics

## NORTH DAKOTA DIGITAL LANDSCAPE DEFINITIONS

Throughout the text, the team employs terms such as "digital skills" and "digital equity." We provide definitions for these terms, and where appropriate the source of these definitions, below.

### **Digital skills:**

A range of abilities to use digital devices, communication applications, and networks to access and manage information. They enable people to create and share digital content, communicate, and collaborate, and solve problems for effective and creative self-fulfillment in life, learning, work, and social activities at large.

• UNESCO

### **Digital literacy**

The ability to use information and communication technologies to find, evaluate, create, and communicate information, requiring both cognitive and technical skills.

American Library Association Digital Literacy Taskforce

### **Digital readiness**

The operational definition of digital readiness includes several things:

- Digital skills, that is, the skills necessary to initiate an online session, surf the internet and share content online.
- Trust, that is, people's beliefs about their capacity to determine the trustworthiness of information online and safeguard personal information.
- These two factors express themselves in the third dimension of digital readiness, namely use the degree to which people use digital tools while carrying out online tasks.
- Pew Research Center

### Foundational digital literacy

Refers to a baseline skillset that workers need to have regardless of industry.

National Skills Coalition

### **Occupations digital literacy**

Entails developing specific technology-related skills needed for a particular occupation or industry.

National Skills Coalition

### Life skills (from K-12 standard)

### Equitable access

All citizens have access to technology, information, and training opportunities regardless of their ethnicity, socio-economic status, age, physical ability, or any other quality.

## INTERNET ACCESS

Policy proposals about digital skills suffer from a lack of readily available data measuring the digital skills in the workforce and skills required by occupations in North Dakota. Instead, a policy recommendation must build a case around the available data that, while indirect, demonstrates to the opportunity for a major upgrade in the digital skills of the North Dakota workforce and broader economy.

Almost any policy advanced in North Dakota enjoys greater chances of successful outcomes due to the amazing level of internet accessibility for North Dakota residents compared to other states. North Dakota Information Technology (NDIT) Chief Technology Officer Duane Schell, reported better than 98% of North Dakota households have access to broadband internet connections. North Dakota achieved this level of access despite having the 17th largest land area for a state with a population density of just 11.3 people per square mile, 47th lowest in the United States. This population density placed North Dakota ahead of only Montana, Wyoming, and Alaska. Figure 1 below is indicative of the degree of broadband access across the state.

It may be difficult to believe, but the map in figure 1 likely underrepresents the degree of connectivity in North Dakota. The Dakota Carrier Network only reports the data for their cooperative members, leaving out portions of the major metropolitan areas in the state which contain significant numbers of households. Through discussions with teams in other states and other interviews looking at the topic of digital skills it is clear the extent of broadband access in North Dakota is an advantage the state should exploit for the population and businesses. Other states require the investment of time, equipment and financial resources prior to other interventions focused on skills to provide access at the levels currently found in North Dakota.

Given the availability of broadband the team then asked: Why might households not utilize broadband? Team deliberations and interviews with others suggested two reasons: 1) unable/unwilling to pay for broadband internet access and, 2) unable/unwilling to pay for a device to connect to broadband internet.



Figure 1. Dakota Carrier Network map



Figure 2. Population count without internet and income between \$10K and \$20K per year

Figure 3. Population count with no internet and income between \$20K and \$35K

Among the other data collected, the U.S. Census Bureau gathers information about those "without internet" by annual income. The maps in figures 2 and 3 display the population count of those "without internet" by two of the lower income classifications for counties in North Dakota. Both maps show the four counties with the highest population count of "no internet" and lower income categories are Burleigh, Cass, Grand Forks, and Ward. Each of these counties contains one of the larger population centers in the state so the high count is not necessarily surprising.

To further highlight the geographic breakdown of the potential deficiency of digital skills the map in figure 4 displays the percentage of individuals, by county, without internet access in North Dakota, independent of income level. The data available from the Census Bureau show Benson and Sheridan counties with quite high percentages of residents with "no internet" with Divide, Sioux, Emmons, and Towner not too far behind them.

The manner by which individuals access the internet is another possible indirect measure of digital skills. Figure 5 maps the Census Bureau's data showing the distribution of those individuals across the state, again as a percentage of the total county population. Towner and Walsh are two counties with the highest percentage of residents with only smartphone access to the internet. Sioux and Dunn counties

Figure 4. Percent of residents without internet access by county





Figure 5. Percent of residents with smartphone only, by county



also display higher percentages. It is notable that the four counties with the highest count of population without internet are not the same counties with the higher percentages, suggesting policy will need to strike a balance between the count and percentage of the population.

### **Conclusions and Recommendations**

The information from North Dakota Information Technology and Dakota Carrier Network highlights a serious advantage for North Dakota. Household connectivity to broadband internet is broadly available across the state regardless of the regional demographics and other characteristics, with only a few gaps in access to address. A further question exists about the ability of households to afford the service, their awareness and usage of programs designed to assist with the cost of internet, and household access to devices to make these connections. There must be some data collected to quantitatively assess the use of programs and the number of residents eligible under various program requirements.

## POTENTIAL RETURN ON INVESTMENT

Early on the team agreed digital skills were of increasing importance to the success of workers and the broader state economy. This impression started from anecdotal information through various meetings and discussions and general impressions based on news stories. Upon further investigation the team used the data from the Brookings Insitute report Digitalization and the American Workforce. This report scored the digital skills required for hundreds of occupations in both 2002 and 2016. The team used data from this report for just over 400 occupations in North Dakota, only using data if businesses or government employed individuals were in the occupation in both years. The first conclusion drawn from the data is: digital skill requirements for many occupations increased from 2002 to 2016.

Figure 6 displays the digital skill requirements for occupations in North Dakota in both 2002 and 2016. Dots along the line would represent equal skill requirements in both 2002 and 2016.1 Dots above the diagonal line indicate an occupation with higher digital skill requirements in 2016 than in 2002, while dots below the diagonal line imply lower digital skill requirements in 2016 than in 2002. The data in figure 6 clearly indicate most occupations increased digital skill requirements from 2002 to 2016. The average for each year bears this out too. In 2002 the average digital score for occupations in North Dakota was 26.74. By 2016 it was 48.60.

Figure 6. Digital skill requirements in 2002 and 2016 for North Dakota occupations.



It is typically expected that increased skills result in increased compensation. To see if there was a similar pattern for digital skills the team gathered data about occupation digital score and annual income (in thousands of dollars) for 2002 and 2016. Figure 7 displays the income and digital score data for 2002. We also include the line of best fit which demonstrates clearly the increasing annual income as digital skills increased. The line indicates each additional digital skill point equated to around \$342.20 in increased annual income.

<sup>&</sup>lt;sup>1</sup> An identical number would not mean the composition of the required skills did not change, simply that the overall number was the same.

Figure 8 shows the skills and earnings data to 2016 for the same occupations, again with a linear fit line included. Once again there is a clear upward slope to the line, indicative of higher earnings as digital skills required for a particular occupation increase. With the 2016 data each additional skill point translates to \$658.40 in higher annual income.

Looking at figures 7 and 8 together it is noticeable that there are more occupations at higher levels of digital skills. The clusters of the points actually are higher on the digital skills axis in 2016 than in 2002. The team decided to look at the occupational distribution by ten-point digital skill range for both 2002 (figure 9) and 2016 (figure 10). Once again, the increase in digital skills inherent in North Dakota jobs is noticeable. The data demonstrate a pronounced decline in occupations in the 0-10 range, from over 75 in 2002 to under 10 in 2016. In addition, there were no occupations with digital scores from 91 to 100 in 2002, which changed by 2016.

Job Service North Dakota maintains a list of "In-Demand Occupations" on their website. The North Dakota Workforce Development Council updates this list annually and evaluates occupations based on total employment, ten year expected job growth, annualized job growth rate over the

same ten years, annual expected job openings, average annual wages, and essential and emerging occupations. Several of the criteria include historic and forecast data. The team took the list of occupations and matched it with the digital score data to provide information about the digital skills and the top 100 occupations. In some cases, where the specificity of the occupation was different compared





Figure 7. Occupation digital skill score and mean annual income (\$000s)



Figure 8. Occupation digital skill score and mean annual income (\$000s)





to the digital skills list, the team took the average. The occupation list and scores are available in the following table. It is interesting to note these "in-demand" occupations have an average digital skill score of 36.76 in 2002 compared to the overall of 26.74, and in 2016 the "in-demand" average was 55.45 while the overall was 48.6. The "in-demand "occupations need higher levels of digital skills than all occupations on average. Improving digital skills access for the population then makes it more likely we can fill these occupations going forward.

Occupation	2002 Digital	2016 Digital
occupation	Score	Score
Instructional Coordinators	32	78
Librarians and Media Collections Specialists	52	66
Secondary School Teachers, Except Special and Career/ Technical Education	30	60
Elementary School Teachers, Except Special Education	45	58
Career/Technical Education Teachers, Secondary School	30	61
Middle School Teachers, Except Special and Career/ Technical Education	30	60
Kindergarten Teachers, Except Special Education	24	28
Special Education Teachers	27	60
Preschool Teachers, Except Special Education	22	29
Health Specialties Teachers, Postsecondary	37	52
Civil Engineers	66	63
Civil Engineering Technologists and Technicians	39	64
Electrical Engineers	78	77
Mechanical Engineers	70	70
Accountants and Auditors	48	63

### **Top 100 In-Demand Jobs and Digital Skills Scores**

Occupation	2002 Digital Score	2016 Digital Score
Bookkeeping, Accounting, and Auditing Clerks	52	57
Financial Managers	41	61
Management Analysts	39	53
Operations Research Analysts	61	78
Statisticians	66	73
Tax Preparers	32	63
Athletic Trainers	3	48
Dental Assistants	40	52
Dental Hygienists	38	49
Diagnostic Medical Sonographers	51	57
Dietitians and Nutritionists	57	54
Medical Assistants	35	64
Nursing Assistants	20	28
Licensed Practical and Licensed Vocational Nurses	30	50
Registered Nurses	38	55
Occupational Therapists	38	50
Occupational Therapy Assistants	17	47
Physical Therapist Assistants	20	44
Psychiatric Technicians	15	50
Respiratory Therapists	55	59
Cardiovascular Technologists and Technicians	48	61
Clinical Laboratory Technologists and Technicians	43	50

Occupation	2002 Digital Score	2016 Digital Score
Emergency Medical Technicians and Paramedics	40	55
Pharmacy Technicians	41	56
Nuclear Medicine Technologists	58	67
Radiologic Technologists and Technicians	55	64
Surgical Technologists	8	42
Veterinary Technologists and Technicians	4	46
Computer and Information Systems Managers	79	92
Computer Network Support Specialists	81	93
Computer Programmers	93	94
Computer Systems Analysts	96	79
Information Security Analysts	90	91
Software Developers and Software Quality Assurance Analysts and Testers	97	91
Telecommunications Equipment Installers and Repairers, Except Line Installers	25	56
Construction Managers	17	60
General and Operations Managers	50	61
Industrial Production Managers	47	60
Medical and Health Services Managers	67	69
Sales Managers	70	60
Compliance Officers	26	66
Human Resources Specialists	37	60
Paralegals and Legal Assistants	39	64
Public Relations Specialists	33	61

Occupation	2002 Digital Score	2016 Digital Score
Market Research Analysts and Marketing Specialists	45	66
Training and Development Specialists	63	59
Securities, Commodities, and Financial Services Sales Agents	34	67
Sales Representatives, Wholesale and Manufacturing, Technical and Scientific Products	24	49
Automotive Service Technicians and Mechanics	39	55
Butchers and Meat Cutters	8	29
Carpenters	0	24
Chefs and Head Cooks	3	46
Crane and Tower Operators	0	35
Diesel Technician	17	48
Industrial Machinery Mechanics	49	45
Bus and Truck Mechanics and Diesel Engine Specialists	17	48
Farm Equipment Mechanics and Service Technicians	19	51
Electricians	43	37
Firefighters	19	40
Hairdressers, Hairstylists, and Cosmetologists	12	36
Heating, Air Conditioning, and Refrigeration Mechanics and Installers	8	50
Machinist	36	41
Plumbers, Pipefitters, and Steamfitters	0	13
Power Plant Operators	23	51

Through various discussions it became obvious that there are at least two difficulties with measurement of digital skills in the North Dakota population. First, the definition of digital skills is not universal and, in many cases, defies even simple description. Therefore, the team early in the process established their definition of digital skills and recommend its adoption by the State of North Dakota:

A range of abilities to use digital devices, communication applications, and networks to access and manage information. They enable people to create and share digital content, communicate, and collaborate, and solve problems for effective and creative self-fulfillment in life, learning, work, and social activities at large. – UNESCO

Second, the acquisition of data related to digital skills within the population or digital skill requirements for occupations is also difficult to evaluate directly. For the purposes of this grant period the team arrived at some indirect measures to inform their recommendations. To understand the digital skills that North Dakota workers and job seekers should have, the team utilized Labor Market Information and O-NET to identify which digital skills are needed for in-demand occupations that do not require a four-year degree or higher. Once this list was compiled, partners at Microsoft determined whether these in-demand jobs required basic, intermediate, or advanced digital skills. (Appendix B)

Occupation	2002 Digital Score	2016 Digital Score
Welders, Cutters, Solderers, and Brazers	3	23
Child, Family, and School Social Workers	53	51
Childcare Workers	8	18
Community and Social Service Specialists, All Other	14	59
Educational, Guidance, and Career Counselors and Advisors	32	59
Health Care Social Workers	42	52
Mental Health and Substance Abuse Social Workers	24	55
Police and Sheriff's Patrol Officers	27	62
Social and Community Service Managers	14	59
Social and Human Service Assistants	16	54
Substance Abuse, Behavioral Disorder, and Mental Health Counselors	28	58
Commercial Pilots	33	52
Heavy & Tractor Trailer Truck Driver	7	30

### DATA COLLECTION AND PERFORMANCE IMPROVEMENT

Data about digital skills is not necessarily readily available. There are no agencies measuring directly the broad digital skills of the North Dakota population or workforce, or any substantial subpopulation. To establish a foundation of the problem, not a direct measurement of digital skills, the team undertook surveys of the individuals in Adult Education and Workforce centers from around the state. These survey results provide valuable information about the needs for future, ongoing, data collection to better guarantee success.

### **Digital Skills Surveys**

A further effort to measure digital skills was a survey provided to Job Service North Dakota Workforce Center staff and Adult Education employees. These surveys asked employees of the two government organizations to comment on the level and nature of digital skills of clients and service users. In all cases terms such as digital skills were left to the interpretation of the respondents. The responses represent a vital start to the development of a coherent, impactful policy to enhance digital skills in the North Dakota workforce. As a first capture of data the survey asked if adult educators saw students who lacked digital skills.

### **Adult Education Center Staff**

### Prompt 1: I saw students who lacked digital skills.

An overwhelming number of respondents somewhat or strongly agreed they saw students lacking digital skills. Respondents worked with adult learners in a variety of settings and the need for digital skills should be interpreted broadly.

# Prompt 2: There is a growing gap between digital skills needed in the job market versus the digital skills of students looking for work.

More than 70% of adult educators at least somewhat agree the gap is widening between adult learners' digital skills and the digital skills requirements from the job market. This perception is very important for policy. As shown above, the digital skills required for many occupations increased significantly from 2002 to 2016. If the gaps are growing more workers are falling further behind for more occupations leading to concerns about long-run employment prospects.

# Prompt 3: There is adequate access to programs offering digital skills training.

All North Dakotans will have equitable access to opportunities to develop digital skills to meet the needs of North Dakota's 21st Century workforce

When asked about the adult learner access to digital skills training programs the most frequent response from adult educators was clearly somewhat agree. It is important to note a few other aspects of the response to this prompt. First, no respondents selected strongly agree, and while this does not mean programs do not exist or that access is not available. it indicates that should it be found that such programs do exist there needs to be better communication about them. Second, somewhat agree was just over 40% of the total responses. Said differently, the somewhat agree responses only beat out the combined somewhat disagree and strongly disagree options by one respondent. As said already, if further







#### Prompt 3 Results



investigation reveals opportunities exist there needs to be better communication about these options. If programs do not exist, policy needs to address the creation of these opportunities.

# Prompt 4: From the following list, indicate what you perceive to be the digital skills necessary for the jobs students are seeking.

The responses to this question are self-explanatory. The high number of responses for each option indicate an expectation on the part of the adult educators that clients need multiple sets of skills in employment settings. The other option received responses that included: "typing work related reports", "proprietary applications", multiple versions of "use email or something like it to communicate with supervisor or other departments", and "accessing online manuals, using tablets for reading blueprints." The implied skill level from these various responses runs from basic to sophisticated.

The results from the next two prompts are very similar. As a result, we preset the prompt and response data and discuss the results together.

# Prompt 5: Are your students seeking jobs expected to have internet access outside of work?

# Prompt 6: Are employers offering technology training for the new hires?

The adult learner responses to these questions indicate a significant amount of uncertainty around the issues of internet access and digital skills. There are a large number of jobs adopting remote work (completely or in hybrid formats) and the lack of internet access from home would likely disqualify potential applicants regardless of other skill levels and attributes. Working remotely would also require a minimum level of digital skills to engage with the workplace.

Uncertainty around the training offered to new hires is important as well. Prior questions provided examples of required, or necessary, digital skills. This included proprietary software from one respondent. If training is not available, or is paired with remote work, there are combinations of skills necessary for new hires to be successful.



### Prompt 5 Results



#### Prompt 6 Results



# Prompt 7: What are you supplementing at the Adult Learning Center to help meet those needs?

This question received a wide variety of responses, with several replicated verbatim below:

We offer free basic computer classes.

We have offered a computer literacy class once a week through WSI grant for the last 3 years. None that I am aware of.

Currently little to nothing, we will be discussing ideas regarding this as a staff soon.

Very little. However, much of that is due to lack of personnel.

Computer electives as possible.

Offer courses related to Microsoft Office applications, resume building, internet safety, file management.

Computer training if necessary, such as Word, Excel & PowerPoint as well as Google docs, Google sheets and fundamentals of computer usage.

Trying to help them learn to login and navigate the web. Apply for jobs online.

A variety of computer skills classes.

Clearly responses vary based on factors specific to the different adult education centers. One response mentioned little being done due to "lack of personnel." There are some education opportunities expanding experience with business software such as Microsoft or Google products, and a mention of cybersecurity. This is an important point to highlight. As worker digital skill levels increase the risk of various cybersecurity threats such as malware, viruses, and identity theft also increase for both the individual and the company employing them.

# Prompt 8: What must North Dakota do to have a workforce that is digitally literate and ready for the workplace?

This prompt received numerous answers that are replicated below due to the information they provided to the policy team. The broad themes include more content for both hardware and software training, as well as more integrated discussions about approaches to meet the training needs of businesses and their potential workers.

Basic Computer classes available at all adult learning centers and public libraries. Also, the tech help desk that many libraries have added is fabulous - someone can go in with their specific question to get assistance.

We should start with free statewide wireless internet access. Many of our students do not have access to the internet due to their rural environment, so they come to class/work unprepared in comparison to their counterparts.

Integrate technology in our classes offered .... create classes that can be used "On the Fly" and ready to go when asked for them. (Making sure to have them ready when the individual asks.)

Students should be leaving the K-12 with a general level of technical competency. The workforce is a broad term. From Taco Bell to owning a thriving business. I do believe there are answers to this question but conversations, interviews with sectors and employees are needed. Technology is job specific. Ideally a technology boot camp (basic tech skills) then onto a mentor training course for the field of employment. I love these conversations!

### Computer training

Create a committee who collaborates with businesses and other entities, such as Job Service, Adult Learning Centers, etc. to create a plan to ensure that all adults are obtaining the technical skills they need.

#### Offer more basic computer classes?

Dollars to fund more computer/digital literacy courses. More on the job training for the jobs specific technology uses, both inside and outside of work. Flexibility with different communication styles -- not all e-mail, app related to work schedules and time off.

We need a computer skills class that teaches typing (finger placement), basic office usage, researching on the web, email etiquette, maybe something else too?

Compile data collected from the employers on the digital skills that employees are expected to possess for a job and share this data with the adult learning centers. Provide funding for computer literacy classes to address the skills needed for employment.

Expanding and/or implementing a training program for Computer literacy and office programs.

Mandatory computer/digital literacy classes beginning in Middle School, a demonstration of digital literacy by Senior year in High School, ending with at least one 200 level course on it in college/university. All students should still take that digital literacy course work at the college/university level, regardless of decided career path/path of study. Potentially supplement this need for digital literacy with an optional basic coding coursework on offer at the high school level.

Include digital literacy at all levels of instruction beginning with the youngest students. All of it age-appropriate, of course. After high school, make digital literacy classes affordable (or free) and accessible for adults who are in need or show an interest.

Integrated technology education in other subject area classrooms.

In corrections, our students should be able to do some limited use/learning using the internet.

Continue to teach students at a young age how to properly use technology and develop skills that make them workforce ready, Students should understand the internet, know how to identify scams, send/receive messages (email, text message, IM), hardware v software.

Continue to train people as needed.

As much as being digitally literate is important, career readiness is even more important. Getting a job and keeping a job, being adaptable, and strong verbal and written skills are essential in today's workforce.

Once our students apply for a job online, they don't always have the skills to be able to check their email to see if they got a response. Then it is recovering what that response means.

# Prompt 9: From the following list, what do you perceive to be the barriers to being a more digitally ready workforce?

Prompt 9 evaluated the perceptions of barriers confronting efforts to increase digital skills in the North Dakota workforce. The response of broadband/internet access is noteworthy due to other research that indicated an overwhelming percentage of households in North Dakota are broadband ready. It is not common knowledge that this is the case though. The cost of internet might also be tied in with this response. Two other responses to highlight include the unclear benefits to gaining digital skills and fear of using technology. The data made the benefits clear earlier in this document:

higher digital skill occupations commanded higher compensation. The issue of "fear" gets at a different challenge: identifying those in need of more digital skills and training them. Effective marketing of programs, proper instructional programs, and demonstration of the benefits may all help overcome these "fears."

### Job Service North Dakota Workforce Center

# Prompt 1: Most Individuals using the services offered in the Workforce Centers lack digital skills.

More than 85% of Workforce Center respondents replied either somewhat agree or strongly agree to this prompt. Workforce Center staff provide a variety of programs and services, just as in the case of the Adult Education respondents, therefore the responses should be interpreted broadly and not necessarily focus on any one type of lacking skill. However, 85% is an overwhelming majority of respondents. The next prompt attempted to focus on one aspect of the Workforce center experience.

### Prompt 2: Digital job applications are difficult to complete for some job seekers who visit the Workforce Centers.

Nearly 95% of workforce center respondents somewhat agree (33.33%) or strongly agree (60.87%) that digital job applications are difficult to fill out. This does not attach, and does not seek to attach, specific fault or blame for this outcome to any particular party. It simply points out that whatever the combination of digital skills in the workforce, and digital skills assumed to be in the workforce by those offering digital job applications, in the opinion of the Workforce Center staff, impairs the

### Prompt 9 Results



#### Prompt 1 Results



Prompt 2: Digital job applications are difficult to complete for some job seekers who visit the Workforce Centers.



workers' ability to complete the application. The result of this is likely to be to the detriment of all parties.

# Prompt 3: There is a growing gap between digital skills needed in the job market versus the digital skills of individuals looking for work.

Fully 85% of Workforce Center staff somewhat agree or strongly agree the skill gap between applicants and job market expectations is increasing. Paired with the results from the Adult Education survey, it is clear there is a strong perception that this is a problem in North Dakota. This problem can lead to suboptimal outcomes for both workers and firms and the possibility of workers experiencing recurring bouts of unemployment due to insufficient levels of digital skills. Firms would also experience problems with fewer workers than necessary and the possible continual adjustments to their workforce or the responsibilities assigned to their different workers.

# Prompt 4: There is adequate access to programs offering digital skills training.

Nearly 70% of Workforce Center respondents somewhat disagree or strongly disagree with the notion there is adequate access to training programs for digital skills. This is significantly higher than the percentage from the Adult Education survey. There is no data available to discuss possible explanations for the wide divergence in responses at this time.

### Prompt 5: Of the following digital skills, which are necessary for individuals to have when seeking Workforce Center services?

The provided responses are selfexplanatory so the focus here is on examination of the respondent provided other responses. These include:

> Virtual Interviews, Employer skill assessment tests, Employer applications, Email - Staff are willing to assist and teach these skills to Job Seekers

A large majority of the people we serve do not know how to get access into their own email. They cannot remember dates of employment to even start to build a resume.

General computer navigation skills.





### Prompt 5 Results



Digital skills to complete an application and questions for a job application and the honesty questions to judge if a person is a good worker.

General computer communication tasks, such as downloading, uploading, adding attachments, printing, email, etc.

They have hard time typing applications or creating accounts to do the applications.

Uploading required documents.

Use applications for training or onboarding.

Multiple responses expressed Workforce Center staff willingness to assist clients, such as, "All that is necessary when seeking services is to ask for help." Some of the other responses do indicate the degree of issue, and requirements for skills. "Training" and "onboarding" requiring the use of applications represent a significant potential hurdle if digital skills are lacking. "Uploading required documents" also likely requires some degree of facility with multiple software applications and multiple types of hardware. The responses are an important start to a larger list of necessary digital skills.

# Prompt 6: From the following list, which do you perceive to be barriers to having a more digitally ready workforce?

Once again, the responses offered by the survey are self-explanatory, but fear of using technology and unclear benefits of gaining digital skills appear as frequent responses here as they did in the Adult Education survey. The cost of access to the Internet, and the availability of devices for access also appear as important responses, as well as the cost of time to learn, which may not be trivial at all for those looking for employment, or better employment.

There were some insightful responses provided as well:

Don't want to learn.

Many have phones that they can use for applying to jobs but lack the knowledge and skills in how to operate them or download resumes to the application using their phone.

Denial that digital skills are necessary.

Lack aptitude for computer and have no interest as computers are frustrating to use if you are unskilled.

They are not used to the technology or have never worked with computers and technology.

Language barriers - difficulty reading and understanding questions (in English) embedded in assessments that form part of a job application.

Training is hard... you can train but if you don't use it, many will lose the knowledge.



The last response is vitally important. Failure to use the skills once learned, no matter the intensity of the training, diminishes the level of skill quickly. Workers in "denial" about the importance of digital skills need only see the positive correlation between the level of digital skills in a job and the average annual income in that occupation to be shown the tangible benefits to the acquisition of skills.

### Prompt 7: Are employers offering technology training for the new hires?

As stated before, for the Adult Education survey, uncertainty about this question is not a good outcome either. The affirmative response was only 8% of responses, leaving 92% saying employers did not offer technology training or were not sure they did. To form the appropriate policy there should be more information about this to allow proper division of skill development responsibilities between the government and business sectors.



# Prompt 8: What must North Dakota do to have a workforce that is digitally literate and ready for the workplace?

The majority of written responses are provided below. Some were removed due to being almost a complete duplication of other responses. The entire set of provided responses is worth reading though there are a few broader themes from the collection: working/coordinating various aspects of skill development/training with employers, more opportunities for skill development/refreshers, identification of populations needing the most assistance.

### Adequate FREE training needs to be provided.

Offering training and an opportunity to practice and feel more comfortable with technology.

Change prevailing attitudes about digital literacy among employers and job seekers.

Many times, the individuals that we are working with have children that know how to operate their devices better than the adult that is applying to a job. They may have the equipment/ or may not but lack the knowledge and skills in how to navigate different job applications, get access to their email, do not know how to clear their voicemail to receive calls from employers.

Easier access, training that is friendly for customers who are older than average, make the digital application process easier, upload resume and be done!

Training, support/assistance from employers with digital tasks and get current technology.

Hire, train and retain more teachers at all grade levels, including adult education.

Identify the population that does not have the skill, and provide training.

Offer resources and provide access to all populations/areas.

There needs to be more free/accessible training for individuals with a digital barrier.

Offer more training programs in simple computer skills.

Better access to computer training classes in adult training centers that are little to no cost. People are willing to unlearn because they don't think that they can be taught, but if we had additional services to teach them regardless of age then they would probably be more willing.

*Target the biggest gaps in technology literacy with services that are meaningful to those populations. Anecdotally speaking - those age 50+, males who perform primarily hands-on work* 

with little day-to-day need for computer skills and individuals with cognitive disabilities.

People with jobs that do not use a computer daily need to have available a way to get the skills needed when looking for work or get the help at the Job Services in ND. There are many construction, farm labor, truck driving kind of jobs that do not entail the use of computers in their daily job life.

Offering training for individuals that have not ever used a basic computer. Our library offers free classes and even one on one.

Have more employers offer more training for new hires?

People can operate their phones, but not as proficient with computers - time & training.

Access in rural areas, courage for individuals to utilize workforce centers, libraries, and the willingness to learn or learn enough to be successful at jobs and applications

Encourage learning in school for youth, offer computer basic classes for those that are unskilled. Employers could have group meetings with applicants who wish to apply but struggle with a computer and lack skills to apply online. Later if applicants seem like a good fit and still interested in working for an employer, they could provide additional accommodation to bring the applicant on board.

Access to internet and a computer is sometimes the biggest obstacle.

Internet access across rural ND.

Basic training- a lot of applicants come in and have no computer skills. They do not know how to click on a link or an answer to questions.

More access in the local and rural areas to computers and broad band. Instructors willing to teach basic computer applications.

Most of my encounters with those who are not digitally prepared to fill out work applications are older individuals.

Offer initial and refresher training for individuals who don't use technology in their daily work/ home life.

Offer free digital literacy training courses or Adult Learning centers

Provide funding opportunities for digital literacy programs; encourage training programs and employers to provide opportunities for digital literacy training; support friends and family members in helping their loved ones achieve digital literacy (e.g., at home programs and resources); promote digital literacy learning using an approach that destigmatizes and demystifies the process; make sure everyone has access to a computer, internet, and cell phone, not just those who can afford or understand it.

More hands-on training for workers, accessibility to equipment.

More access to affordable digital training.

May have someone that could help them to go through the process especially for older people. Maybe having some training for people that need. But most oilfield or people that are doing construction work do not want to learn and they just need someone to help.

Increase digital learning at a younger stage of life, improve digital learning curriculum, more hands-on learning, align more with needs of digital world at all age levels,

*I believe that the employers need to understand how difficult some of their application process' are. They are missing out on potential prospects because their application process is difficult.* 

Determine what skills businesses need by position and offer training to build those skills, before applying/interviewing. Offer a certificate of actual skills/skill levels acquired.

Provide incentives to ND employers if/when they invest in offering digital literacy training/

opportunities to prospective employees of theirs.

More training opportunities, businesses that sell computers, cell phones, etc. should be promoting where to go in their respective area to learn more on how to operate the device.

Starting at the school level, having a computer competency. Other states have something like this in place. Training centers would be nice. Our local Adult Learning Center provides some very short-term classes when instructors are available. The local library will help one-on-one with basics as well as cell phones, Kindles/Nooks, and iPad books. Something more consistent, easily available and at times that are conducive for the employed to access when they are not working.

Promote and offer technical trainings?

Make computers more available, also have trainings available for people who have no computer skills.

Have free classes often and at all times of day. Advertising has to stress that it's for people with NO technology skills. Have repetitive classes. Being taught something 1 time and then not using the skills right away doesn't work. There should be up to date books that can be given out with practice exercises, etc. Partner with libraries to help people with the practice.

Discuss digital literacy more at the state level, inform employers, involve education.

Have training let your workers in the Employment Agencies help more hands on teaching them also.

Offer free training 1 a week through the Adult Learning Center, College Universities or TrainND.

Internet access completely across the state. The workforce needs to want to learn to be literate. You may provide resources, but if they don't want to access those resources there is nothing you can do.

Offer easy access to digital training and offer it frequently to cover multiple time frames for users

### SURVEY DISCUSSION

Survey responses, other data collected, and the Digital Equity Act all recognize the necessity of digital skills in the current workforce, regardless of the specific occupation. The lack of coordinated and consistent collection regarding digital skills necessitates the creation of a data collection plan, proper instruments for collection, and coordination of collection efforts across various partner organizations. It would be best if coordination of efforts were housed in one organization capable of bringing together multiple, if not all, relevant agencies involved.

Data related to digital skills has a natural pairing with other data already available related to North Dakota. In the case of job market data, the U.S. Bureau of Labor Statistics, alone and through North Dakota Labor Market Information, provides data about wages, employment levels, and more at various geographic levels. The combination of this data with digital skills in occupations can be used in a manner similar to the above discussion and graphics that used North Dakota labor data and Brookings Institute digital skills in occupation data. This data would be more granular and specific to the State of North Dakota and would provide excellent feedback about the success of policy or policies.

An appropriate measurement of digital skills should include some form of direct measurement from covered populations and some indirect measurement. As an example, the training efforts mentioned in the surveys already provide an indirect assessment of population skills. During training, attendees could provide responses to assessment instruments while being given a simultaneous evaluation of skills or problems by the training supervisor or instructor. Such a system would require an event to "train the trainers" to guarantee the most consistent delivery possible across the state and different agencies. The initial surveys demonstrated significant gaps in digital skills that would negatively impact the efforts of job seekers. These include issues such as email navigation, inability to upload resumes, website form completion and others.

The survey results indicate that both Adult Education and Workforce centers provide training opportunities already but find significant problems with the existing digital skills of the populations served. These two groups would be natural candidates to continue their work, possibly expand their offerings, and work with other agencies to direct more digital skills and literacy efforts. Other agencies and groups such as EduTech, the North Dakota Department of Health and Human Services, and the North Dakota State Library and North Dakota Library Association, and Tribal Colleges, all of which have significant contact with various covered populations in the state, would be good partners to work with on these policies.

### **COVERED POPULATIONS**

The Digital Equity Act identified several covered populations including individuals living in covered households, aging individuals, incarcerated individuals other than those incarcerated in a federal correctional facility, veterans, individuals with disabilities, individuals with a language disability who are either English language learners (ELL) or have low levels of literacy, individuals who are members of a racial or ethnic minority group, and individuals who primarily reside in a rural area. The team provides some information about the different covered groups, the geographic distribution of the covered populations, and the implications for how they need to be reached.

### **Minority Percentage**

The overall minority percentage in North Dakota is low but does have some notable geographic concentration. Rolette, Towner, and Benson counties have a high percentage of minorities in their overall population.

If we focus on the American Indian/Alaska Native population (category) defined by the Census Bureau, we see the same counties with high percentages. This is not a surprise with the Native American population representing the biggest minority population category in the state. Highlighting this particular group also highlights the need for specific partners such as the Tribal Colleges in the state as well as other parts of tribal government.

### **Veterans' Population Percentage**

North Dakota is around 9% veterans and the map in figure 6 demonstrates it is spread across the state with some significant concentrations in a few counties. The team recognized significant geographic overlap between the veteran data and rurality.

### **Rural Designation**

Primary residence within a rural area is another covered population under the Digital Equity Act. As the map in figure 7 illustrates, there are a significant number of rural counties and areas in North Dakota. Even in many of these rural areas there is access to broadband internet, increasing employment opportunities for workers who reside primarily in these areas. The ability to work in these areas in a remote capacity expands greatly the employment options available to this population. Figure 4. Percentage of overall county population that is minority



Figure 5. American Indian Alaskan Native population percentage











## CONCLUSION

This body of work will accelerate the research and development of a comprehensive digital equity plan under the Digital Equity Act throughout the next year. In the meantime, the state has existing programs that can be leveraged and better promoted to help advance digital skill development for adult learners, workers, and job seekers, including the newly launched Cisco Networking Academy Skills for All initiative that went live in July 2022. Successfully increasing digital skills for North Dakota workers and job seekers will rely heavily on participation of partners including, but not limited to, Job Service North Dakota, Adult Education, North Dakota University System, tribal colleges, libraries, Department of Health and Human Services, and more. Engagement with all these partners is critical and must continue in order to develop the most effective strategies, programs, and related policies to enhance equitable access to training opportunities to equip workers with the skills they need to enter, re-enter, and move throughout the workforce.

Below are recommendations that reflect research done to this point and should be built into the North Dakota's upcoming digital equity plan.

### **Digital Literacy Recommendations**

Vision: All North Dakotans will have equitable access to opportunities to develop digital skills to meet the needs of North Dakota's 21st Century workforce.

Goal # 1	Strategies	Strategies Responsible Agents	
Improved appropriateness & consistency of assistance delivered across agencies	Survey of identified agencies workforce to determine nature and extent of skill gaps and assistance available	Agency leads or designees, Commerce, Health & Human Services, WIOA Workforce Partners, and others	Survey results collected by end of Q4/2022
	Hiring of Digital Equity Coordinator using Digital Equity Act planning grant	NDIT	Q4/2022
	Engage businesses to determine skills needed for new workers (survey or another instrument)	Commerce, Digital Equity Coordinator	Q4/2022
	"Train the trainer" professional development	Agencies that serve adult workers, job seekers, and learners	Training event(s) Q2/2023
	Establish, track/develop statistics such as digital skills in jobs or workers after separation with available data from ND LMI	WIOA Evaluation Team	Q3/2022

Goal #2	Strategies	Responsible Agencies	Success Metrics & Dates
Increase clients receiving fundamental digital skills training from agencies	Track and report on clients and classify digital skills assistance/training needed and provided, modify assessments with Yes/No about digital skills of client	WIOA Workforce Partners, Health & Human Services, North Dakota Libraries, Tribal Colleges	Modification to assessment: Q4/2022
	Marketing campaign about programs available to help with internet and device availability as well as availability of high-speed internet	Coordinated with NDIT, and other partners	Start Q1/2023

Goal #3	Strategies	Responsible Agencies	Success Metrics & Dates
Engaging with Tribal partners to identify digital skill gaps and training opportunities	Working with Indian Affairs Commission, Tribal Colleges, and other Tribal entities	Commerce, Digital Equity Coordinator, Governor's Office	Assess participation interest on the part of Tribal colleges, Q4/2022

### APPENDIX A NORTH DAKOTA DIGITAL LANDSCAPE DEFINITIONS

### **Digital skills:**

A range of abilities to use digital devices, communication applications, and networks to access and manage information. They enable people to create and share digital content, communicate, and collaborate, and solve problems for effective and creative self-fulfillment in life, learning, work, and social activities at large.

UNESCO

### **Digital literacy**

The ability to use information and communication technologies to find, evaluate, create, and communicate information, requiring both cognitive and technical skills.

American Library Association Digital Literacy Taskforce

### **Digital readiness**

The Operational definition of digital readiness includes several things:

- Digital skills, that is, the skills necessary to initiate an online session, surf the internet and share content online.
- Trust, that is, people's beliefs about their capacity to determine the trustworthiness of information online and safeguard personal information.
- These two factors express themselves in the third dimension of digital readiness, namely use the degree to which people use digital tools while carrying out online tasks.
- Pew Research Center

### Foundational digital literacy

Refers to a baseline skillset that workers need to have regardless of industry.

National Skills Coalition

### **Occupations digital literacy**

Entails developing specific technology-related skills needed for a particular occupation or industry.

National Skills Coalition

### Life skills (from K-12 standard)

### **Equitable access**

All citizens have access to technology, information, and training opportunities regardless of their ethnicity, socio-economic status, age, physical ability, or any other quality.

## APPENDIX B DIGITAL SKILL MAPPING

### Methodology

To categorize the skills needed for each job into basic, intermediate, and advanced levels, we assumed that each career would require at least foundational digital skills.

Basic skills were ones that centered around using the Microsoft suite and web browsing software. These skills also included routine data entry processes, by which we mean data entry software that uses prompts or other proscribed mechanisms and does not require strategizing from the employee about how to best manage data.

Intermediate skills were ones that required more interaction with data analysis and management. They also required innovation or creativity on the part of employees, through producing content or processing of data.

Advanced skills included the use of highly specialized software for modeling, programming, or coding. These skills also required a degree of innovation and management when using the specialized software.

OCCUPATION	SKILL LEVEL	TYPICAL ENTRY LEVEL DEGREE	DIGITAL SKILLS
Teaching Assistants, Except Postsecondary	Intermediate	High school diploma or equivalent	Computer based training software - Appletree; Padlet; Quizlet; Schoology Database user interface & query software - Automate the Schools ATS; Blackboard software; Data entry software; Student information systems SIS Desktop communications software - ClassDojo; ParentSquare; Tadpoles Spreadsheet software - Microsoft Excel Video creation & editing software - Flipgrid; Loom
Bookkeeping, Accounting, and Auditing Clerks	Advanced	High school diploma or equivalent	Accounting software - Fund accounting software; Intuit QuickBooks; Sage 50 Accounting; Tax software Cloud-based data access & sharing software - Dropbox; Google Drive; Microsoft SharePoint Compliance software - Corporate Responsibility System Technologies Limited CRSTL Compliance Positioning System; Financial compliance software; Intrax ProcedureNet; SageEDP Payroll Tax Enterprise resource planning ERP software - Microsoft Dynamics GP; NetSuite ERP; Oracle Hyperion; Oracle JD Edwards Enterprise One Financial analysis software - Delphi Technology; Oracle E-Business Suite Financials; RSM McGladrey Advanced Practice Solutions Paperless Audit; RSM McGladrey Auditor Assistant
Psychiatric Aides	Basic	High school diploma or equivalent	Database user interface & query software - Data entry software Electronic mail software - Email software Operating system software - Microsoft Windows Spreadsheet software - Microsoft Excel Word processing software - Microsoft Word
Pharmacy Technicians	Basic	High school diploma or equivalent	Database user interface & query software - Database software; Drug compatibility software Label making software - Label-making software Medical software - Medical condition coding software; MEDITECH software; Patient record maintenance software; Pharmaceutical software Presentation software - Microsoft PowerPoint Spreadsheet software - Microsoft Excel
Carpenters	Intermediate	High school diploma or equivalent	Accounting software - Intuit QuickBooks; Intuit Quicken; Job costing software Office suite software - Microsoft Office Project management software - Bosch Punch List; Estimating software; Turtle Creek Software Goldenseal; VirtualBoss Spreadsheet software - Microsoft Excel Word processing software - Microsoft Word; Wilhelm Publishing Threshold
Chefs and Head Cooks	Intermediate	High school diploma or equivalent	Analytical or scientific software - Axxya Systems Nutritionist Pro; GNOME Gnutrition; Ipro Restaurant Inventory, Recipe & Menu Software; Nutrition analysis software Database user interface & query software - Barrington Software CookenPro Commercial; CostGuard; Culinary Software Services ChefTec; ReServe Interactive Electronic mail software - Email software Instant messaging software - GroupMe Spreadsheet software - Google spreadsheet; Microsoft Excel

OCCUPATION	SKILL LEVEL	TYPICAL ENTRY LEVEL DEGREE	DIGITAL SKILLS
Electricians	Advanced	High school diploma or equivalent	Analytical or scientific software - Construction Master Pro; Electrosoft FlashWorks; Elite Software Inpoint; SoftEmpire Electrical Calculations Computer aided design CAD software - Autodesk AutoCAD; One Mile Up Panel Planner Database user interface & query software - Database software; Insight Direct ServiceCEO; Sage 300 Construction & Real Estate; Shafer Service Systems Industrial control software - Supervisory control & data acquisition SCADA software; Wonderware InTouch Word processing software - Microsoft Word; Socratres Contractor's Library
Machinist	Advanced	High school diploma or equivalent	Analytical or scientific software - Armchair Machinist software; CNC Consulting Machinists' Calculator; Kentech Kipware Trig Kalculator Computer aided design CAD software - Autodesk AutoCAD; Dassault Systemes CATIA; PTC Creo Parametric; SolidCAM Computer aided manufacturing CAM software - Autodesk Fusion 360; CNC Mastercam; Dassault Systemes SolidWorks; One CNC CAD/CAM Enterprise resource planning ERP software - ERP software; JobBOSS; SAP Presentation software - Microsoft PowerPoint
Plumbers, Pipefitters, and Steamfitters	Advanced	High school diploma or equivalent	Accounting software - Bookkeeping software; Intuit QuickBooks; Intuit Quicken; KRS Enterprises Service First! Analytical or scientific software - Bentley Systems AutoPIPE; COADE CAESAR II; Quote Software QuoteExpress; Watter Hammer Software Hytran Computer aided design CAD software - AEC Design Group CADPIPE; Drawing & drafting software; Horizon Engineering Sigma Plumbing Calculator; ViziFlow Project management software - Estimating software; FastEST FastPipe; Piping construction costs estimation software; Vision InfoSoft Plumbing Bid Manager Word processing software - Atlas Construction Business Forms; Contractor City Contractor Forms Pack; Microsoft Word; Wilhelm Publishing Threshold
Childcare Workers	Basic	High school diploma or equivalent	Computer based training software - Educational software; Schoology Desktop communications software - Tadpoles Internet browser software - Web browser software Multi-media educational software - Nearpod; Seesaw Word processing software - Microsoft Word
Police and Sheriff's Patrol Officers	Intermediate	High school diploma or equivalent	Database user interface & query software - Database software; Microsoft Access; National Crime Information Center NCIC database; Spillman Technologies Records Management Electronic mail software - Email software; Microsoft Outlook Graphics or photo imaging software - Computer aided composite drawing software; DesignWare 3D EyeWitness; SmartDraw.com SmartDraw Legal; SmugMug Flickr Presentation software - Microsoft PowerPoint Spreadsheet software - IBM Lotus 1-2-3; Microsoft Excel
Social and Human Service Assistants	Basic	High school diploma or equivalent	Database user interface & query software - Database software; Microsoft Access Electronic mail software - Microsoft Outlook Medical software - Electronic medical record EMR software; MEDITECH software; PointClickCare HER Presentation software - Microsoft PowerPoint Spreadsheet software - Microsoft Excel

OCCUPATION	SKILL LEVEL	TYPICAL ENTRY LEVEL DEGREE	DIGITAL SKILLS
Nursing Assistants	Basic	Postsecondary nondegree award	Accounting software - Billing software Electronic mail software - Microsoft Outlook Medical software - Epic Systems; Medical condition coding software; Medical procedure coding software; MEDITECH software Spreadsheet software - Microsoft Excel Video conferencing software - FaceTime
Dental Assistants	Basic	Postsecondary nondegree award	Accounting software - Intuit Quicken Electronic mail software - Email software Medical software - Henry Schein Dentrix; Kodak Dental Systems Kodak SOFTDENT Practice management software PMS; Patterson Dental Supply Patterson EagleSoft; The Systems Workplace TDOCS Office suite software - Microsoft Office Spreadsheet software - Microsoft Excel
Massage Therapists	Basic	Postsecondary nondegree award	Calendar & scheduling software - AppointmentQuest Online Appointment Manager; Scheduling software Medical software - ICS Software SammyUSA; Land Software Customer Pro-File; Massage Suite; WinCity Custom Software WinCity Massage SOAP Notes Spreadsheet software - Microsoft Excel Word processing software - Microsoft Word
Medical Assistants	Basic	Postsecondary nondegree award	Accounting software - Billing software; Bookkeeping software; Intuit QuickBooks Database user interface & query software - Data entry software; Database software; Microsoft Access Electronic mail software - Email software; Microsoft Exchange; Microsoft Outlook Medical software - Epic Systems; Health care common procedure coding system HCPCS; Medical condition coding software; MEDITECH software Office suite software - Business software applications; Microsoft Office
Licensed Practical and Licensed Vocational Nurses	Basic	Postsecondary nondegree award	Categorization or classification software - diagnostic & procedural coding software Electronic mail software - Microsoft Exchange; Microsoft Outlook Medical software - Epic Systems; Health care common procedure coding system HCPCS; Medical condition coding software; MEDITECH software Spreadsheet software - Microsoft Excel Video conferencing software - FaceTime
Phlebotomists	Basic	Postsecondary nondegree award	Electronic mail software - Microsoft Outlook Medical software - Donor management system software; Electronic medical record EMR software; Medical procedure coding software; MEDITECH Laboratory & Microbiology Office suite software - Microsoft Office Spreadsheet software - Microsoft Excel Word processing software - Microsoft Word
Skincare Specialists	Basic	Postsecondary nondegree award	Internet browser software - Web browser software Office suite software - Microsoft Office Presentation software - Microsoft PowerPoint Spreadsheet software - Microsoft Excel Word processing software - Microsoft Word
Emergency Medical Technicians and Paramedics	Basic	Postsecondary nondegree award	Information retrieval or search software - Epocrates; HyperTox; Skyscape Rosen and Barkin's 5-Minute Emergency Medicine Consult; TechOnSoftware HazMatCE Pro Medical software - MedDataSolutions Regist*r; MEDITECH software Office suite software - Microsoft Office Presentation software - Microsoft PowerPoint Spreadsheet software - Microsoft Excel

OCCUPATION	SKILL LEVEL	TYPICAL ENTRY LEVEL DEGREE	DIGITAL SKILLS
Ophthalmic Medical Technicians	Basic	Postsecondary nondegree award	Electronic mail software - Email software Medical software - AcuityPro; EyeMD EMR Health care Systems EyeMD EMR; MediPro Medisoft Clinical; NaviNet Open Office suite software - Microsoft Office Presentation software - Microsoft PowerPoint Spreadsheet software - Microsoft Excel
Surgical Technologists	Basic	Postsecondary nondegree award	Electronic mail software - Email software Graphics or photo imaging software - Graphics software Medical software - Electronic medical record EMR software; MEDITECH software; Patient tracking software; Surgery workflow communication software Office suite software - Microsoft Office Spreadsheet software - Microsoft Excel
Telecommunications Equipment Installers and Repairers, Except Line Installers	Intermediate***	Postsecondary nondegree award	Analytical or scientific software - Fluke Clearsight Analyzer; Fluke Networks TechAdviser Field Access System Communications server software - IBM Domino Expert system software - Fluke Networks Fluke TechEXPERT Presentation software - Microsoft PowerPoint Spreadsheet software - Microsoft Excel
Automotive Service Technicians and Mechanics	Intermediate***	Postsecondary nondegree award	Analytical or scientific software - Blue Streak Electronics Buell Diagnostic; CODA Engine Analysis System; Nexiq Tech HDS Suite for Palm; SPX/OTC Genisys ConnecTech PC Database user interface & query software - Data entry software; Database software; Recordkeeping software; Work order management software Electronic mail software - IBM Notes; Microsoft Outlook Facilities management software - Alliance Automotive Shop Controller; Amcom AUTOS2000; Scott Systems MaxxTraxx Pro; Snap-On ShopKey Video creation & editing software - YouTube
Industrial Machinery Mechanics	Intermediate	Postsecondary nondegree award	Database user interface & query software - Data entry software; Maintenance planning & control software Electronic mail software - Microsoft Outlook Enterprise resource planning ERP software - SAP Industrial control software - BIT Corp ProMACS PLC; KEYENCE PLC Ladder Logic; Supervisory control & data acquisition SCADA software Spreadsheet software - Microsoft Excel
Bus and Truck Mechanics and Diesel Engine Specialists	Basic***	Postsecondary nondegree award	Analytical or scientific software - Cummins Insite; Engine diagnostic software Enterprise resource planning ERP software - SAP Facilities management software - Computerized maintenance management system software CMMS; Shop management software Office suite software - Microsoft Office Spreadsheet software - Microsoft Excel
Farm Equipment Mechanics and Service Technicians	Basic	Postsecondary nondegree award	Database user interface & query software - FarmLogic FarmPAD; ServiceMax Electronic mail software - Microsoft Outlook Facilities management software - Computerized maintenance management system CMMS Spreadsheet software - Microsoft Excel Word processing software - Microsoft Word

OCCUPATION	SKILL LEVEL	TYPICAL ENTRY LEVEL DEGREE	DIGITAL SKILLS
Firefighters	Basic	Postsecondary nondegree award	Database user interface & query software - Affiliated Computer Services ACS FIREHOUSE; Fire incident reporting systems; Microsoft Access Electronic mail software - Email software Geographic information system - Geographic information system GIS software Office suite software - Corel WordPerfect; Corel WordPerfect Office Suite; Microsoft Office Spreadsheet software - Microsoft Excel
Hairdressers, Hairstylists, and Cosmetologists	Basic	Postsecondary nondegree award	Accounting software - Intuit QuickBooks Office suite software - Microsoft Office Point of sale POS software - Sale processing software Spreadsheet software - Microsoft Excel Video creation & editing software - YouTube
Heating, Air Conditioning, and Refrigeration Mechanics and Installers	Intermediate	Postsecondary nondegree award	Database user interface & query software - Data entry software; Data logging software; Database software Electronic mail software - IBM notes; Microsoft Exchange; Microsoft Outlook Facilities management software - Computerized maintenance management system CMMS; Facility energy management software; Johnson Controls Metasys; ManagerPlus Industrial control software - Alerton Ascent Compass; Building automation software; Honeywell WEBs-N4; Siemens APOGEE Building Automation Software Presentation software - Microsoft PowerPoint
Welders, Cutters, Solderers, and Brazers	Basic	Postsecondary nondegree award	Analytical or scientific software - Fred's Tip Cartridge Picker; Scientific Software Group Filter Drain FD; Value Analysis Database user interface & query software - Oracle software; Recordkeeping software Electronic mail software - IBM Notes; Microsoft Outlook Office suite software - Microsoft Office Spreadsheet software - Microsoft Excel
Wind Turbine Service Technicians	Basic	Postsecondary nondegree award	Electronic mail software - Microsoft Outlook Enterprise resource planning ERP software - SAP Industrial control software - Industrial control systems software; Programmable logic controller PLC software; Supervisory control & data acquisition SCADA software; Vestas Wind Systems A/S Vestas Remote Panel Presentation software - Microsoft PowerPoint Spreadsheet software - Microsoft Excel
Commercial Pilots	Advanced	Postsecondary nondegree award	Analytical or scientific software - Calibration software; Litchi; Pilot Navigator Software Load Balance; Pix4Dmapper Database user interface & query software - Airline Pilots Daily Aviation Logs PPC; AirSmith FlightPrompt; doXstor Flight Level Logbook; Skylog Services Skylog Pro Development environment software - Adobe Systems Adobe Creative Suite; Standard generalized markup language SGML Map creation software - ESRI Site Scan for ArcGIS; OpenDroneMap Office suite software - Microsoft Office
Heavy & Tractor Trailer Truck Driver	Basic	Postsecondary nondegree award	Database user interface & query software - ddlsoftware.com drivers daily log program DDL; Fog Line Software Truckn Pro; TruckersHelper Inventory management software - Computerized inventory tracking software Route navigation software - ALK Technologies PC*Miller; MarcoSoft Quo Vadis Spreadsheet software - Microsoft Excel Word processing software - 3M Post-it App; Evernote; Microsoft Word

OCCUPATION	SKILL LEVEL	TYPICAL ENTRY LEVEL DEGREE	DIGITAL SKILLS
Preschool Teachers, Except Special Education	Basic	Associate degree	Computer based training software - Common Curriculum; EasyCBM; Padlet; Schoology Desktop communications software - Bloomz; ClassDojo; Edmodo; Tadpoles Electronic mail software - Email software Multi-media educational software - Nearpod; Seesaw Spreadsheet software - Microsoft Excel
Civil Engineering Technologists and Technicians	Advanced	Associate degree	Computer aided design CAD software - Autodesk AutoCAD; Autodesk AutoCAD Civil 3D; Autodesk Revit; Bentley MicroStation Development environment software - Microsoft Visual Basic; National Instruments LabVIEW Electronic mail software - Email software; IBM Notes; Microsoft Outlook Geographic information system - ESRI ArcGIS software; Geographic information system - GIS software Presentation software - Microsoft PowerPoint
Dental Hygienists	Basic	Associate degree	Accounting software - Dental billing software Electronic mail software - Email software Medical software - Dental charting software; Dental office management software; Henry Schein Dentrix; Patterson Dental Supply Patterson EagleSoft Office suite software - Microsoft Office Spreadsheet software - Microsoft Excel
Diagnostic Medical Sonographers	Basic	Associate degree	Database user interface & query software - Database software Electronic mail software - Email software Medical software - Medical procedure coding software; MEDITECH software; Patient medical record software Office suite software - Microsoft Office Spreadsheet software - Microsoft Excel
Occupational Therapy Assistants	Intermediate	Associate degree	Accounting software - Billing software; Bookkeeping software; Fifth Walk BillingTracker; Financial record software Computer based training software - BrainTrain IVA+Plus; Language arts educational software; Math educational software Database user interface & query software - Database software; dBASE; FileMaker Pro; Microsoft Access Medical Software - BrainTrain Captain's Log; Laboratory information system LIS; TheraClin Systems iMAPR; Visual Health Information VHI PC-Kits Presentation software - Microsoft PowerPoint
Physical Therapist Assistants	Intermediate***	Associate degree	Action games - Video game software; Virtual reality game software Database user interface & query software - dBASE; FileMaker Pro; Microsoft Access Electronic mail software - Email software; Microsoft Outlook Medical software - BioEx Systems Exercise Pro; Medical condition coding software; Rehab Documentation Company ReDoc Suite; TherAssist Presentation software - Microsoft PowerPoint
Respiratory Therapists	Basic	Associate degree	Electronic mail software - Microsoft Outlook Medical software - Electronic medical record EMR software; HMS; MEDITECH software Office suite software - Microsoft Office Presentation software - Microsoft PowerPoint Spreadsheet software - Microsoft Excel

OCCUPATION	SKILL LEVEL	TYPICAL ENTRY LEVEL DEGREE	DIGITAL SKILLS
Cardiovascular Technologists and Technicians	Basic	Associate degree	Database user interface & query software - Database software; Structured data entry software Inventory management software - Pyxis MedStation software Medical software - Electronic medical record EMR software; MEDITECH software; Practice management software PMS; Smart Digital Holter Monitor Office suite software - Microsoft Office Spreadsheet software - Microsoft Excel
Nuclear Medicine Technologists	Basic	Associate degree	Electronic mail software - Microsoft Outlook Medical software - Electronic medical record EMR software; MEDITECH software; Medovation RadRunner; Radiopharmacy inventory databases Office suite software - Microsoft Office Presentation software - Microsoft PowerPoint Spreadsheet software - Microsoft Excel
Radiologic Technologists and Technicians	Intermediate	Associate degree	Categorization or classification software - Diagnostic & procedural coding software Database user interface & query software - Data entry software; Structured data entry software Medical software - Medical condition coding software; Medical procedure coding software; MEDITECH software; Virtual reality computed tomography CT imaging software Presentation software - Microsoft PowerPoint Spreadsheet software - Microsoft Excel
Computer Network Support Specialists	Advanced	Associate degree	Configuration management software - Automated installation software; EMC Ionix Network Configuration Manager; Patch & update management software; Vmware Network monitoring software - Dartware InterMapper; Nagios; WildPackets OmniPeek Network Analyzer; Wireshark Operating system software - Microsoft Windows Server; Oracle Solaris; Red Hat Enterprise Linux; UNIX Shell Presentation software - Microsoft PowerPoint Transaction security & virus protection software - Encryption software; McAfee; Symantec; Symantec Norton Antivirus
Computer User Support Specialists	Advanced	Associate degree	Database management system software - Apache Hive;         Elasticsearch; MongoDB; Oracle PL/SQL         Database user interface & query software - Blackboard         software; MySQL; Oracle JDBC; Transact-SQL         Development environment software - Apache Ant; Apache         Kafka; Common business-oriented language COBOL; Microsoft         PowerShell         Operating system software - Microsoft Windows Server; Oracle         Solaris; Red Hat Enterprise Linux; UNIX Shell         Web platform development software - Django; Google         AngularJS; Microsoft ASP.NET; Core MVC; Spring Framework
Paralegals and Legal Assistants	Intermediate	Associate degree	Analytical or scientific software - a la mode WinTOTAL; LexisNexis CourtLink Strategic Profiles; Litigation support software; Uniscribe Database user interface & query software - Data entry software; Microsoft Access ; Relational database software; TrialWorks Document management software - Adobe Systems Adobe Acrobat ; Document management system software; Microsoft Office SharePoint Server MOSS; Summation Blaze Information retrieval or search software - American LegalNet USCourtForms; LawManager; LexisNexis; Westlaw Word processing software - Google Docs; Legal document software; Microsoft Word; The Sackett Group MacPac for Legal

OCCUPATION	SKILL LEVEL	TYPICAL ENTRY LEVEL DEGREE	DIGITAL SKILLS
Power Plant Operators	Advanced	Associate degree	Analytical or scientific software - Landfill gas analysis software; Landtec System Software LFG Pro Electronic mail software - Email software; Microsoft Outlook Industrial control software - Distributed control system DCS; General Electric Mark VI Distributed Control System DCS; Interlock shutdown systems; Yokogawa FAST/TOOLS Presentation software - Microsoft PowerPoint Spreadsheet software - Microsoft Excel
Instructional Coordinators		Bachelor's degree	Computer based training software - Common Curriculum; EasyCBM; Moodle; Schoology Graphics or photo imaging software - Adobe Systems Adobe Creative Cloud; Adobe Systems Adobe Flash; Adobe Systems Adobe Illustrator; Adobe Systems Adobe Photoshop Video creation & editing software - Adobe Systems Adobe After Effects; Flipgrid; Screencast-O-Matic; WeVideo Web page creation & editing software - Adobe Systems Adobe Dreamweaver; Adobe Systems Adobe Flash Player; Nvu; SeaMonkey Web platform development software - Cascading style sheets CSS; Drupal; Hypertext markup language HTML; JavaScript
Librarians and Media Collections Specialists		Bachelor's degree	<ul> <li>Database user interface &amp; query software - Blackboard software; Database software; Microsoft Access; Structured query language SQL</li> <li>Graphics or photo imaging software - Adobe Systems Adobe Illustrator; Adobe Systems Adobe Photoshop; Graphics software; SmugMug Flickr</li> <li>Library software - Online Computer Library Center OCLC; RCL Software Media Library Manager; Surpass; WorldCat</li> <li>Web page creation &amp; editing software - Adobe Systems Adobe Dreamweaver; Adobe Systems Adobe Flash Player; Facebook; Wiki software</li> <li>Web platform development software - Cascading style sheets CSS; Drupal; Hypertext markup language HTML; PHP</li> </ul>
Secondary School Teachers		Bachelor's degree	Analytical or scientific software - Desmos; Geogebra Cloud-based data access & sharing software - Google Drive; Microsoft SharePoint Computer based training software - Common Curriculum; Instructional software; Moodle; Schoology Development environment software - ABC programming language; Logo Video creation & editing software - Flipgrid; Screencastify; Video editing software
Elementary School Teachers		Bachelor's degree	Computer based training software - Common Curriculum; Easy CBM; Padlet; Schoology Desktop communications software - ClassDojo; Classtag; Tadpoles Electronic mail software - Email software; Microsoft Outlook Graphics or photo imaging software - Graphics software; JamBoard Multi-media educational software - Edpuzzle; Kahoot; Nearpod; Seesaw
Career/Technical Education Teachers, Secondary School		Bachelor's degree	Computer based training software - Blackboard Learn; Learning management system LMS; Padlet; Sakai CLE Electronic mail software - Email software; Microsoft Outlook Information retrieval or search software - DOC Cop; iParadigms Turnitin Multi-media educational software - Edpuzzle; Kahoot Word processing software - Collaborative editing software; Google Docs; Microsoft Word

OCCUPATION	SKILL LEVEL	TYPICAL ENTRY LEVEL DEGREE	DIGITAL SKILLS
Middle School Teachers, Except Special and Career/ Technical Education		Bachelor's degree	Computer based training software - Common Curriculum; Moodle; Padlet; Schoology Desktop communications software - Classtag; Edmodo; Tadpoles Electronic mail software - Email software; Microsoft Outlook Multi-media educational software - Kahoot; Nearpod; Seesaw Video creation & editing software - Apple Final Cut Pro; Flipgrid; Screencastify; Video editing software
Kindergarten Teachers, Except Special Education		Bachelor's degree	Computer based training software - Children's educational software; Padlet Desktop communications software - Bloomz Electronic mail software - Microsoft Outlook Office suite software - Microsoft Office Spreadsheet software - Microsoft Excel
Special Ed. Kindergarten, Elementary, Secondary School		Bachelor's degree	Computer based training software - Children's educational software; EasyCBM; Rethink Ed; Scientific Learning Fast ForWord Database user interface & query software - American Sign Language Browser; Indivualized Educational Program IEP software Device drivers or system software - Screen magnification software; Screen reader software; Synapse outSPOKEN; The vOICe Learning Edition Electronic mail software - Email software; Microsoft Outlook Voice recognition software - goQ WordQ; Nuance Dragon Naturally Speaking; Voice activated software Graphics or photo imaging software (secondary school) - Adobe Systems Adobe Illustrator; Adobe Systems Adobe Photoshop Presentation software (secondary school) - Microsoft PowerPoint Spreadsheet software (secondary school) - Microsoft Excel
Civil Engineers		Bachelor's degree	Analytical or scientific software - Dassault Systemes Abaqus; HES-HMS; Minitab; The MathWorks MATLAB Computer aided design CAD software - Autodesk AutoCAD Civil 3D; Autodesk Revit; Bentley MicroStation; Dassault Systemes SolidWorks Development environment software - C; Microsoft Visual Basic; National Instruments LabVIEW; Verilog Graphics or photo imaging software - Adobe Systems Adobe Fireworks; Bentley GeoPak Bridge; SmugMug Flickr; Trimble SketchUp Pro Presentation software - Microsoft PowerPoint
Electrical Engineers		Bachelor's degree	Analytical or scientific software - MathWorks Simulink; Minitab; Powersim PSIM; The MathWorks MATLAB Computer aided design CAD software - Autodesk AutoCAD Civil 3D; Autodesk Revit; Bentley MicroStation; Dassault Systemes SolidWorks Development environment software - Eclipse IDE; Integrated development environment IDE software; Microsoft Visual Basic for Applications VBA; Microsoft Visual Basic Scripting Edition VBScript Operating system software - Bash; Microsoft Windows Server; Shell script; UNIX Word processing software - Microsoft OneNote; Microsoft Word

OCCUPATION	SKILL LEVEL	TYPICAL ENTRY LEVEL DEGREE	DIGITAL SKILLS
Mechanical Engineers		Bachelor's degree	Analytical or scientific software - MAYA Nastran; Minitab; ReliaSoft Weibull++ 6; The MathWorks MATLAB Computer aided design CAD software - Autodesk AutoCAD Civil 3D; Autodesk Revit; Bentley MicroStation; Dassault Systemes SolidWorks Development environment software - Microsoft Visual Basic; Microsoft Visual Basic for Applications VBA; National Instruments LabVIEW; Verilog Instant messaging software - Blink Object or component oriented development software - C++; Perl; Python; R
Accountants and Auditors		Bachelor's degree	Accounting software - Fund accounting software; Intuit QuickBooks; Sage 50 Accounting; Summit Software Summit Biofuels Accounting Enterprise resource planning ERP software - Microsoft Dynamics GP; NetSuite ERP; Oracle Hyperion; Oracle JD Edwards EnterpriseOne Financial analysis software - Delphi Technology; Oracle E-Business Suite Financials; TopCAATs; Tropics workers' compensation software Tax preparation software - ATX Total Tax Office; CCH ProSystem fx TAX; NewPortWave Year End Solutions; Thomson GoSystem Tax Word processing software - Google Docs; Microsoft OneNote; Microsoft Word
Financial Managers		Bachelor's degree	Accounting software - Accounts receivable software; Fund accounting software; Intuit QuickBooks; Sage 50 Accounting Business intelligence & data analysis software - IBM Cognos Impromptu; MicroStrategy; Oracle Business Intelligence Enterprise Edition; Qlik Tech QlikView Database user interface & query software - Microsoft SQL Server; Oracle software; Structured query language SQL; Yardi software Enterprise resource planning ERP software - Microsoft Dynamics GP; NetSuite ERP; Oracle Hyperio ; Oracle JD Edwards EnterpriseOne Presentation software - Microsoft PowerPoint
Management Analysts		Bachelor's degree	Database user interface & query software - Airtable; Blackboard software; Oracle JDBC; Transact-SQL Development environment software - Apache Ant; Apache Kafka; Common business oriented language COBOL; Go Enterprise resource planning ERP software - Microsoft Dynamics GP; NetSuite ERP; Oracle Hyperion; Oracle JD Edwards EnterpriseOne Object or component oriented development software - Advanced business application programming ABAP; Apache Groovy; jQuery; Scala Web platform development software - Backbone.js; Google AngularJS; Microsoft ASP.NET Core MVC; Spring Framework
Operations Research Analysts		Bachelor's degree	Analytical or scientific software - IBM SPSS Statistics; ILOG OPL-CPLEX Development System; Minitab; The MathWorks MATLAB Database user interface & query software - Amazon Redshift; Microsoft SQL Server; MySQL; Structured query language SQL Object or component oriented development software - Perl; R; Scala; Swift Operating system software - Bash; Oracle Solaris; Shell script; UNIX Shell Word processing software - Google Docs; Microsoft Word

OCCUPATION	SKILL LEVEL	TYPICAL ENTRY LEVEL DEGREE	DIGITAL SKILLS
Tax Preparers		Bachelor's degree	Accounting software - Intuit QuickBooks; M8 Client Billing; Quicken; Tax software Electronic mail software - Email software; Microsoft Outlook Financial analysis software - Datair Employee Benefits Systems; Sales Tax Tools Sales Tax Researcher; Sungard Relius; Sync Essentials Trade Accountant Spreadsheet software - Microsoft Excel; Thomson GoSystem My TaxInfo Tax preparation software - ATX Total Tax Office; CCH ProSystem fx TAX; Creative Solutions UltraTax CS; Petz Enterprises V-Tax
Athletic Trainers		Bachelor's degree	Database user interface & query software - Database software;Digital Coach AthleticTrainer; Injury tracking software; PremierSoftware Simtrak MobilityElectronic mail software - Email softwareMedical software - BioEx Systems Exercise Pro; ImPACTApplications ImPACTPresentation software - Microsoft PowerPointSpreadsheet software - Microsoft Excel
Dietitians and Nutritionists		Bachelor's degree	Analytical or scientific software - Axxya Systems Nutritionist Pro; Compu-Cal Nutrition Assistant; Monash University Low FODMAP Diet App; The Nutrition Company Food Works Database user interface & query software - CyberSoft Nutribase; Database software; DietMaster Systems DietMaster; ValuSoft MasterCook Desktop communication software - Skype Medical software - BioEx Systems Nutrition Maker Plus; Lifestyles Technologies DietMaster Pro; MNT Northwest MNT Assistant; SureQuest Systems Square 1 Spreadsheet software - Microsoft Excel
Registered Nurses		Bachelor's degree	Cloud-based data access sharing software - Google Drive; Microsoft SharePoint Database user interface & query software - Data entry software; Database software; FileMaker Pro; Microsoft Access Electronic mail software - IBM Notes; Microsoft Exchange; Microsoft Outlook Medical software - Epic Systems; Health care common procedure coding system HCPCS; Henry Schein Dentrix; Medical condition coding software Word processing software - Google Docs; Microsoft Word
Medical and Clinical Laboratory Technologists		Bachelor's degree	Electronic mail software - Email software Medical software - Electronic medical record EMR software; Medical procedure coding software; MEDITECH software; Test routing software Office suite software - Microsoft Office Presentation software - Microsoft PowerPoint Spreadsheet software - Microsoft Excel
Medical and Clinical Laboratory Technicians		Bachelor's degree	Database user interface & query software - Data entry software; Database software; FileMaker ProElectronic mail software - Email software; IBM Notes; Microsoft OutlookMedical software - Electronic medical record EMR software; Laboratory information system LIS; MEDITECH software; Test routing softwareSpreadsheet software - Microsoft Excel Word processing software - Google Docs; Microsoft Word

OCCUPATION	SKILL LEVEL	TYPICAL ENTRY LEVEL DEGREE	DIGITAL SKILLS
Computer and Information Systems Managers		Bachelor's degree	Database management system software - Apache Solr; MongoDB; NoSQL; Oracle PL/SQLDatabase user interface & query software - Amazon Web Service AWS software; Blackboard software; Microsoft SQL Server; MySQLDevelopment environment software - Common business oriented language COBOL; Eclipse IDE; Integrated development environment IDE software; Microsoft .NET FrameworkEnterprise resource planning ERP software - Microsoft Dynamics GP; NetSuite ERP; Oracle Hyperion; Oracle JD Edwards EnterpriseOneWeb platform development software - Apache Tomcat; Backbone.js; Node.js; Spring Framework
Computer Programmers		Bachelor's degree	Database management system software - Amazon DynamoDB; Elasticsearch; MongoDB; Oracle PL/SQL Development environment software - Apache Ant; Apache Kafka; Common business oriented language COBOL; Go Object or component oriented development software - Advanced business application programming ABAP; Apache Spark; Objective C; Scala Presentation software - Microsoft PowerPoint Web platform development software - Backbone.js; Microsoft ASP.NET Core MVC; React; Spring Framework
Computer Systems Analysts		Bachelor's degree	Database user interface & query software - Amazon ElasticCompute Cloud EC2; Blackboard software; Oracle JDBC;Transact-SQLDevelopment environment software - Apache Ant; ApacheKafka; Common business oriented language COBOL; GoObject or component oriented development software -Advanced business application programming ABAP; ApacheGroovy; Objective C; ScalaProgram testing software - Functional testing software; HewlettPackard LoadRunner; JUnit; SeleniumWeb platform development software - Backbone.js; MicrosoftASP.NET core MVC; React; Spring Framwork
Intelligence Analysts		Bachelor's degree	<ul> <li>Analytical or scientific software - Data visualization software; Link analysis software; SAS statistical software; Telephone analysis software</li> <li>Database management system software - Apache Hadoop; Apache Hive; Apache Pig; Relational database management software</li> <li>Database user interface &amp; query software - Amazon Web Services AWS software; Microsoft Access; Microsoft SQL Server; Structured query language SQL</li> <li>Geographic information system - ESRI ArcGIS software; ESRI ArcView; Geographic information system GIS software; Google Earth Pro</li> <li>Presentation software - Microsoft PowerPoint</li> </ul>
Information Security Analysts		Bachelor's degree	Database user interface & query software - Amazon Elastic Compute Cloud EC2; Amazon Redshift; Blackboard software; Oracle JDBC Development environment software - Apache Ant; Apache Kafka; Common business oriented language COBOL; Go Network monitoring software - Nagios; Network intrusion prevention systems NIPS; Symantec Blue Coat Data Loss Prevention; WireShark Transaction security & virus protection software - HP WebInspect; McAfee; NortonLifeLock cybersecurity software; Portswigger BurP Suite Web platform development software - Django; Google AngularJS; Microsoft ASP.NET; Spring Framework

OCCUPATION	SKILL LEVEL	TYPICAL ENTRY LEVEL DEGREE	DIGITAL SKILLS
Software Developers		Bachelor's degree	Database management system software - Amazon DynamoDB; Elasticsearch; MongoDB; Oracle PL/SQL Database user interface & query software - Airtable; Apache Hive; Blackboard software; Transact-SQL Development environment software - Advanced business application programming ABAP; Apache Ant; Common business oriented language COBOL; Go Object or component oriented development software - Apache Groovy; Apache Spark; Objective C; Scala Web platform development software - Backbone.js; Microsoft ASP.NET Core MVC; React; Spring Framework
Software Quality Assurance Analysts and Testers		Bachelor's degree	Database user interface & query software - Airtable; Apache Hive; Blackboard software; Transact-SQL Development environment software - Apache An ; Apache Kafka; Common business oriented language COBOL; Go Object or component oriented development software - Advanced business application programming ABAP; Apache Spark; Objective C; Scala Program testing software - Hewlett Packard LoadRunner; IBM Rational Robot; JUnit; Selenium Web platform development software - Backbone.js; Microsoft ASP.NET Core MVC; React; Spring Framework
Web Developers and Digital Interface Designers		Bachelor's degree	Database user interface & query software - Airtable; Blackboard software; Oracle JDBC; Transact-SQL Development environment software - Apache Ant; Apache Kafka; Common business oriented language COBOL; Go Object or component oriented development software - Advanced business application programming ABAP; Apache Spark; Objective C; Scala Operating system software - Microsoft Windows Server; Oracle Solaris; Red Hat Enterprise Linux; UNIX Shell Web platform development software - Backbone.js; Microsoft ASP.NET Core MVC; React; Spring Framwork
Construction Managers		Bachelor's degree	Cloud-based data access & sharing software - Dropbox; Google Drive; Microsoft SharePoint Computer aided design CAD software - Autodesk AutoCAD; Autodesk AutoCAD Civil 3D; Autodesk Revit; Computer aided design & drafting software CADD Database user interface & query software - Database software; ISS Construction Manager; Sage 300 Construction & Real Estate; Yardi software Document management software - Adobe Systems Adobe Acrobat; Axios Systems assyst; Daily Manager; Site Manager Project management software - HCSS HeavyBid; HCSS HeavyJob; Oracle Primavera Enterprise Project Portfolio Management; Quantum Software Solutions Quantum Project Manager
General and Operations Managers		Bachelor's degree	Business intelligence & data analysis software - IBM Cognos Impromptu; MicroStrategy; Oracle Business Intelligence Enterprise Edition; Qlik Tech QlikView Customer relationship management CRM software - Act!; Oracle Eloqua; Salesforce software; Sugar CRM Database user interface & query software - Airtable; Amazon Web Services AWS software; Blackboard software; Yardi software Enterprise resource planning ERP software - Microsoft Dynamics GP; NetSuite ERP; Oracle Hyperion; Oracle JD Edwards EnterpriseOne Operating system software - Apple macOS; Microsoft Windows; Oracle Solaris; Shell script

OCCUPATION	SKILL LEVEL	TYPICAL ENTRY LEVEL DEGREE	DIGITAL SKILLS
Industrial Production Managers		Bachelor's degree	Database user interface & query software - Database software; Exact Software JobBOSS; FileMaker Pro; Scadex Technologies MAESTRO Electronic mail software - Email software; IBM Notes ; Microsoft Outlook Enterprise resource planning ERP software - NetSuite ERP; Oracle JD Edwards EnterpriseOne; Oracle PeopleSoft; SAP business & customer relations management software Industrial control software - AVEVA InTouch HMI; Distributed control system DCS; Schneider Electric CitectSCADA; Supervisory control & data acquisitiion SCADA software Video creation & editing software - Adobe Systems Adobe After Effects ; Apple Final Cut Pro; YouTube
Medical and Health Services Managers		Bachelor's degree	<ul> <li>Analytical or scientific software - Expert Health Data Programming Vitalnet; IBM SPSS Statistics; Relative Values for Physicians;</li> <li>SAS statistical software Categorization or classification software - American Medical Association CodeManager; ColorSoft AutoMatch; Yost Engineering ABN Assistant; Yost Engineering CodeSearch Pro Database user interface &amp; query software - Blackboard software; Microsoft SQL Server; Structured query language SQL; Yardi software</li> <li>Enterprise resource planning ERP software - Microsoft Dynamics; Oracle Hyperion; Oracle JD Edwards EnterpriseOne; Oracle PeopleSoft</li> <li>Medical software - Epic Systems; Health care common procedure coding system HCPCS; Henry Schein Dentrix; Medical condition coding software</li> </ul>
Sales Managers		Bachelor's degree	Business intelligence & data analysis software - IBM Cognos Impromptu; MicroStrategy; Oracle Business Intelligence Enterprise Edition; Qlik Tech QlikView Customer relationship management CRM software - Eden Sales Manager; HEAT Software GoldMine; Oracle Eloqua; Salesforce software Database user interface & query software - Airtable; Microsoft SQL Server; Oracle software; Yardi software Development environment software - Eclipse IDE; Microsoft Azure; Microsoft Visual Basic; Microsoft Visual Basic for Applications VBA Enterprise resource planning ERP software - Microsoft Dynamics GP; NetSuite ERP; Oracle Hyperion; Oracle JD Edwards EnterpriseOne
Compliance Officers		Bachelor's degree	Database user interface & query software - Commercial driver's license information system CDLIS; Database software; Microsoft Access; Traffic record databases Electronic mail software - Microsoft Outlook Optical character reader OCR or scanning software - Document scanning software Presentation software - Microsoft PowerPoint Spreadsheet software - Microsoft Excel

OCCUPATION	SKILL LEVEL	TYPICAL ENTRY LEVEL DEGREE	DIGITAL SKILLS
Human Resources Manager		Bachelor's degree	Accounting software - AccountantsWorld Payroll Relief; Intuit QuickBooks; New World Systems Logos.NET; Sage 50 Accounting Enterprise resource planning ERP software - Microsoft Dynamics; Microsoft Dynamics GP; Oracle PeopleSoft; SAP business & customer relations management software Human resources software - ADP Workforce Now; Human resource management software HRMS; Oracle Taleo; peoplefluent Performance Presentation software - Mentimeter; Microsoft PowerPoint Time accounting software - ADP ezLaborManager; Kronos Workforce Timekeeping; Soft Trac Microix Timesheet; Stromberg Enterprise
Human Resources Specialists		Bachelor's degree	Business intelligence & data analysis software - IBM Cognos Impromptu; MicroStrategy; Oracle Business Intelligence Enterprise Edition; Qlik Tech QlikView Database user interface & query software - Airtable; Blackboard software; LinkedIn; Microsoft SQL Server Enterprise resource planning ERP software - Microsoft Dynamics GP; NetSuite ERP; Oracle Hyperion; Oracle JD Edwards EnterpriseOne Graphics or photo imaging software - Adobe Systems Adobe Creative Cloud; Adobe Systems Adobe Illustrator; Adobe Systems Adobe Photoshop; SmugMug Flickr Human resources software - ADP Workforce Now; Kronos Workforce HR; Lawson Human Resource Management; Oracle Taleo
Public Relations Specialists		Bachelor's degree	Database user interface & query software - Airtable; Cision CisionPoint; FileMaker Pro; LinkedIn Graphics or photo imaging software - Adobe Systems Adobe Creative Cloud; Adobe Systems Adobe Illustrator; JamBoard; SmugMug Flickr Video creation & editing software - Adobe Systems Adobe After Effects; Apple Final Cut Express; Apple Final Cut Pro; YouTube Web Page creation & editing software - Adobe Systems Adobe Dreamweaver; Facebook; Social media sites; Website management software Web platform development software - Cascading style sheets CSS; Drupal; Hypertext markup language HTML; JavaScript
Market Research Analysts and Marketing Specialists		Bachelor's degree	Analytical or scientific software - IBM SPSS Statistics; Minitab; Sawtooth Composite Product Mapping CPM; The MathWorks MATLAB Customer relationship management CRM software - Blackbaud The Raiser's Edge; Insightful Corporation Confirmit; Oracle Eloqua; Salesforce software Database user interface & query software - Airtable Amazon Redshift; Microsoft SQL Server; MySQL Enterprise resource planning ERP software - Microsoft Dynamics; NetSuite ERP; Oracle Hyperion; Oracle PeopleSoft Information retrieval or search software - Factiva; LexisNexis; Mintel Reports; Verispan Patient Parameters

OCCUPATION	SKILL LEVEL	TYPICAL ENTRY LEVEL DEGREE	DIGITAL SKILLS
Training and Development Specialists		Bachelor's degree	Computer based training software - Adobe Systems Adobe Captivate; Common Curriculum; Moodle; SumTotal Systems ToolBook Graphics or photo imaging software - Adobe Systems Adobe Creative Cloud; Adobe Systems Adobe Illustrator; Adobe Systems Adobe Photoshop; SmugMug Flickr Presentation software - Google slides; Metimeter; Microsoft PowerPoint; Poll Everywhere Video conferencing software - Cisco Webex; Google Meet; LogMeIn Go ToMeeting; Zoom Web platform development software - Apache Struts; Backbone.js; Django; Drupal
Securities, Commodities, and Financial Services Sales Agents		Bachelor's degree	Customer relationship management CRM software - CSI Complex Systems ClientTrade; Microsoft Dynamics; Oracle Siebel CRM; Salesforce software Database user interface & query software - Database management software; FileMaker Pro; Microsoft Access; Web- based information systems Enterprise resource planning ERP software - Microsoft Dynamics GP; Oracle Hyperion; Oracle PeopleSoft; SAP business & customer relations management software Financial analysis software - Bloomberg Professional; Oracle E-Business Suite Financials; Triple Point Commodity XL; Web- based trading systems Presentation software - Microsoft PowerPoint
Sales Representatives, Wholesale and Manufacturing, Technical and Scientific Products		Bachelor's degree	Analytical or scientific software - IBM SPSS Statistics ; SAS statistical software; StataCorp Stata Customer relationship management CRM software - Act!; ActionWare; Salesforce software ; Sybase iAnywhere Sales Anywhere Electronic mail software - IBM Notes; Microsoft Exchange; Microsoft Outlook Enterprise resource planning ERP software - Microsoft Dynamics; NetSuite ERP; Oracle Hyperion; Oracle PeopleSoft Video conferencing software - LogMeIn Go ToMeeting
Precision Agriculture Technicians		Bachelor's degree	Analytical or scientific software - AGCO GTA Software Suite; Farm Works Site Pro; MapShots EASi Suite; SST Development Group SSToolbox Database user interface & query software - Ag Leader Technology SMS Advanced; John Deere Apex Farm Management; Microsoft Access; Novariant AutoFram AF Viewer Geographic information system - ESRI ArcGIS software; ESRI ArcPad; ESRI ArcView Map creation software - GeoAgro GIS; Trimble AgGPS EZ-Map; Trimble AgGPS MultiPlane Presentation software - Microsoft PowerPoint
Child, Family, and School Social Workers		Bachelor's degree	Computer based training software - EasyCBM Database user interface & query software - Microsoft Access; Student information systems SIS Electronic mail software - Microsoft Outlook Medical software - Patient electronic medical record EMR software Spreadsheet software - Microsoft Excel
Community and Social Service Specialists, All Other		Bachelor's degree	N/A

OCCUPATION	SKILL LEVEL	TYPICAL ENTRY LEVEL DEGREE	DIGITAL SKILLS
Social and Community Service Managers		Bachelor's degree	Database user interface & query software - Client information databases; FileMaker Pro; Microsoft Access Medical software - Health care common procedure coding system HCPCS; PointClickCare health care software Office suite software - Corel WordPerfect Office Suite; Microsoft Office Presentation software - Microsoft PowerPoint Spreadsheet software - Corel QuattroPro; IBM Lotus 1-2-3; Microsoft Excel
Substance Abuse, Behavioral Disorder, and Mental Health Counselors		Bachelor's degree	Electronic mail software - Email software; Microsoft Outlook Enterprise resource planning ERP software - Management information systems MIS; Microsoft Dynamics; Oracle PeopleSoft Internet browser software - Microsoft Internet Explorer; Netscape Navigator; Web browser software Medical software - Client information database systems; Patient electronic medical record EMR software Presentation software - Microsoft PowerPoint
Statisticians		Master's degree	Analytical or scientific software - IBM SPSS Statistics; Minitab; SAS statistical software; The MathWorks MATLAB Database user interface & query software - Amazon Redshift; Microsoft Access; Microsoft SQL Server; Structured query language SQL Data mining software - Angoss KnowledgeSEEKER; NCR Teradata Warehouse Miner; SAS Enterprise Miner Object or component oriented development software - C++; Python; R; Sun Microsystems Java Presentation software - Microsoft PowerPoint
Occupational Therapists		Master's degree	Computer based training software - Language arts education software; Special education educational software; Text reader software; Text to speech software Graphics or photo imaging software - Computer drawing software; Mayer-Johnson Boardmaker Medical software - Bizmatics PrognoCIS EMR; Casamba Smart; HMS; Lexrotech LxPediatric Optical character reader OCR or scanning software - Duxbury Braille Translator; Text scanning software Word processing software - Crick Software Clicker 4; Microsoft Word; OpenOffice; WRITER
Educational, Guidance, and Career Counselors and Advisors		Master's degree	<ul> <li>Analytical or scientific software - ACT WorkKeys; Career Dimensions Focus 2; Computerized testing programs; Counseling software</li> <li>Computer based training software - Common Curriculum; Moodle; Padlet; Schoology</li> <li>Database user interface &amp; query software - Blackboard software; Database software; FileMaker Pro; Microsoft Access</li> <li>Project management software - Google Classroom; Microsoft Project; Palm Pal Transana; Productivity software</li> <li>Web page creation &amp; editing software - Facebook; LinkedIn; Orbius; Web page design &amp; editing software</li> </ul>

OCCUPATION	SKILL LEVEL	TYPICAL ENTRY LEVEL DEGREE	DIGITAL SKILLS
Health care Social Workers		Master's degree	Database user interface & query software - Command         Systems ComServe; Database software; Relational database         software         Desktop publishing software - Adobe Systems Adobe         PageMaker; Microsoft Publisher         Medical software - Health care common procedure coding         system HCPCS; Medical procedure coding software; Medical         records software; MEDITECH software         Office suite software - Corel WordPerfect Office Suite; Microsoft         Office         Presentation software - Information presentation software;         Microsoft PowerPoint
Marriage and Family Therapists		Master's degree	Accounting software - Intuit QuickBooks Electronic mail software - Microsoft Outlook Medical software - Advantage Software PsychAdvantage; eMDs Medisoft; SumTime Software SumTime; Synergistic Office Solutions SOS Case Manager Presentation software - Microsoft PowerPoint Spreadsheet software - Microsoft Excel
Mental Health and Substance Abuse Social Workers		Master's degree	Desktop publishing software - Adobe Systems Adobe PageMaker; Microsoft Publisher Electronic mail software - Email software; Microsoft Outlook Internet browser software - Microsoft Internet Explorer; Netscape Navigator; Web browser software Medical software - Client records software; Medical condition coding software; Medical procedure coding software; Patient electronic medical record EMR software Presentation software - Information presentation software; Microsoft PowerPoint
Health Specialties Teachers, Postsecondary		Doctoral or professional degree	Computer based training software - Adobe Systems Adobe Presenter; Articulate Rapid E-Learning Studio; Blackboard Learn; Learning management system LMS Database user interface & query software - Blackboard software; EcoLogic ADAM Indoor Air Quality & Analytical Data Management; Microsoft Access Electronic mail software - Email software; Microsoft Outlook Medical software - Health care common procedure coding systems HCPCS; InteractElsevier Netter's 3D Interactive Anatomy; Medical condition coding software; Medical procedure coding software Word processing software - Collaborative editing software; Google Docs Microsoft Word

## APPENDIX C NORTH DAKOTA DIGITAL SKILLS ASSET INVENTORY

Organization Name	Program Name	Organization Type	Website	City
Region III Adult Learning Center - Devils Lake		Higher Education	Irsc.edu	Devils Lake
Region III Adult Learning Center - Belcourt		Higher Education	tm.edu	Belcourt
Region IV Adult Learning Center Grand Forks		Higher Education	gfschools.org	Grand Forks
Region V - Fargo Adult Learning Center		K-12 School	fargo.k12.nd.us/alc	Fargo
Region V - Wahpeton Adult Learning Center		Higher Education	ndscs.edu	Wahpeton
Region VI- Valley City Adult Learning Center		K-12 School	sheyennevalleyctc.k12.nd.us	Valley City
Region VI- Jamestown Adult Learning Center		K-12 School	jamestown.k12.nd.us/james-valley-ctc	Jamestown
Region VII - Bismarck Adult Learning Center		K-12 School	bismarckschools.org/ adultlearningcenter	Bismarck
Region I - Williston Adult Learning Center		Higher Education	willistonstate.edu	Williston,
Region II - Minot Adult Learning Center		K-12 School	minotadultlearningcenter.com/	Minot
Region VIII - Dickinson Adult Learning Center		K-12 School	dickinsonalc.com	Dickinson
Department of Corrections & Rehabilitation	The Last Mile Program	Corrections		
NDSCS/TechSpark	UpskillND	Higher Education	ndscs.edu/UpskillingND	Bismarck
ND State Library	Universal Class	Library	http://library.nd.gov/publications/ universalclassguide.pdf	
Emerging Prairie	Emerging Digial Academy (advanced training)		Emerging Digital Academy: A full-stack coding bootcamp in Fargo, North Dakota (emergingacademy.org)	
TrainND SW	Digital Lit Training	Higher Education	bismarckstate.edu/ continuingeducation/business/ MedicalComputerandTechnicalTraining/	
Microsoft Global Skills Initiaitive	LinkedIn Learning	Private Sector	opportunity.linkedin.com/	