# Digital Literacy

## Further Developing Michigan's Twenty-First Century Workforce

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Connect Michigan & Connected Nation

2013 Co-Learning Plan Series

MSU EDA University Center for Regional Economic Innovation (REI)

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# Digital Literacy: Further Developing Michigan's Twenty-First Century Workforce

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# INTRODUCTION AND PURPOSE

> The evolution from an agricultural to an industrial society required the adoption of new skills, and also a spatial reorganization of production with cities being far more effective means for the organization of production. As we move from an industrial to a knowledge-based economy, we need to prepare for the social and spatial changes that might accompany this powerful economic realignment. The move from farm to factory to office, and from tangible to intangible production, characterizes the changing condition of many economies during the past decades. (Corey and Wilson, 2006)

Michigan's economy has followed the pattern of economic changes described by Corey and Wilson. For each major evolution of the global economy (i.e. from agriculture to industry to knowledge), technology has brought about spatial and social reorganization in order to facilitate efficiency, increase production, and decrease expenditure. With technological change, however, the skills of the employed also need to shift to accommodate the use of new tools and machinery. Most recently, the transition to a knowledge-based economy has been facilitated by the development of information and communications technology (ICT). Firms able to capitalize on the rapid development of ICTs have the ability to take advantage of a global marketplace and workforce (Frederick, 2006).

Michigan's economy is deeply rooted in the automotive industry and related manufacturing. With access to a global workforce, manufacturing firms have shifted many of the traditional manufacturing jobs out of Michigan, and also the United States, where low-skill labor is more cost effective. During this same period, the United States and, to some degree, Michigan experienced a rise in knowledge-based and service industry occupations, positions that often require a high level of ICT-related skills and education. This presents an ICT skills gap between those losing traditional manufacturing jobs that may not require digital skills and employment opportunities in the knowledge-based economy.

The purpose of this collaborative learning plan is an examination of the ICT skills or "digital literacy"[1] skills gap and its relationship to workforce and economic development in Michigan. This plan will provide the following discussions:

1. Definition of digital literacy and an exploration of the associated skills;
2. Relationship between digital literacy and workforce and economic development;

[1] Digital literacy can be defined as the relationship between one's tactile and cognitive ability to use information communications technology (ICT) hardware, software, and connectivity to access, manipulate, create, analyze, manage, and communicate information. Further discussion of this term follows in the next section of this paper.

3. The state of digital literacy in Michigan;
4. Summary and exploration of various digital literacy training models from Michigan and abroad; and
5. A proposed model for expanding digital literacy training opportunities in Michigan.

# DEFINITION OF DIGITAL LITERACY

Digital literacy, electronic or e-skills, technical skills, e-business skills, information skills, media literacy, and many others are all examples of terms coined to describe the relationship between one's tactile and cognitive ability to use information and communications technology (ICT) hardware, software, and connectivity to access, manipulate, create, analyze, manage, and communicate information. As ICT technologies and their multitude of usages have evolved and grown during the last half of the twentieth century, so have the definitions of these terms.

## Evolution of Digital Literacy

Digital literacy is tied to the concept of information literacy, which can be defined as the "ability to access and use information," and is often identified with computer skills and the capability of individuals to deal with information from the Internet (Pinter, 2008). In the 1970s, information literacy was a term associated with educational reform (Zurkowski, 1974). Buchinal defined it as a "set of skills" that included the ability to find and use information, using information to problem-solve and make decisions, and having the capacity to search for information efficiently (1976). During the 1980s, information literacy became an emphasis in higher education in the United States, with the idea that it was a learning method or tool, instead of just a set of abilities (Pinter, 2008). The Association of College and Research Libraries adopted "Information Literacy Competency Standards for Higher Education", which outlined the skills that were needed to locate, evaluate, and use information efficiently (ACRL, 2000).

Digital literacy can also be viewed through the lens of equality. Digital inequality, commonly referred to as the "digital divide," has often been defined as an access issue, as noted by the U.S. Department of Commerce:

> Some individuals have the most powerful computers, the best telephone service and the fastest Internet service, as well as a wealth of content and training relevant to their lives… Another group of people does not have access to the newest and the best computers, the most reliable telephone service or the fastest or most convenient Internet services. The difference between these two groups is… the Digital Divide. (Selwyn, 2004, p. 344)

However, the digital divide can also be examined through looking at digital skills, as access to the Internet does not necessarily mean that a community or household knows how to use it effectively (Epstein et al., 2011). Dimaggio and Hargittai looked at digital literacy, or digital skills, in terms of digital inequality. They found that there were five dimensions where digital inequality might exist: technical means[2], autonomy of use[3],

[2] "Technical means" refers to "the adequacy of hardware, software, and connections" (Dimaggio & Hargittai (2001).

variation in use[4], social support[5], and skill, or the ability to use digital mediums effectively (2001). Skill was defined as Internet competence, or how well users can respond to challenges and opportunities that are found on the Internet. They hypothesized that Internet competence was related to both one's capacity to use the Internet for self-chosen purposes and one's satisfaction with and persistence in using the Internet (Dimaggio & Hargittai, 2001).

**Governmental Definitions**

Many governmental organizations have also developed definitions of digital literacy. The European Commission emphasizes semantic rather than instrumental skills: literacy as the command of media content rather than delivery. Media literacy is the ability to access, analyze, and evaluate the power of images, sounds, and messages we are confronted with on a daily basis as an important part of contemporary culture, also emphasizing how we communicate on a personal basis. This definition relates to all media types (i.e. television, film, radio, recorded music, print media, Internet, and new digital communication technologies). Media literacy skills, therefore, are focused on command of messaging rather than on technology, and competencies are focused on making and interpreting meaning (Nansen et al, 2012).

Other governmental definitions of digital literacy have focused on a more instrumental or practical definition of the term. California was one of the first states to define, develop, and promote digital literacy in its report, 'Digital Literacy Pathways in California.' The report defines digital literacy as "a lifelong learning process of capacity building for using digital technology, communication tools, and/or networks in creating, accessing, analyzing, managing, integrating, evaluating, and communicating information in order to function in a knowledge-based economy and society," (ICT Digital Leadership Council, 2010).

Likewise, the Australian Communications and Media Authority (ACMA) define digital literacy as, "technical and intellectual skills to access, understand, and participate in or create content on digital media and communications technologies." In this definition, literacy is centered on technology and relates to competencies like using applications, information searching, navigating, assessing, and communicating information (Nansen et al., 2012).

In the United States National Broadband Plan, the Federal Communications Commission (FCC) postulates that, absent a standard definition of digital literacy, the term generally

[3] "Autonomy of use" refers to the location where individuals access the Internet and the flexibility they have to use it for preferred activities (Dimaggio & Hargittai (2001).

[4] "Variation in use" refers to the use patterns of different Internet users (how income, education, and other factors influence use) (Dimaggio & Hargittai (2001).

[5] "Social support" refers to the availability of more experienced users that can assist individuals in becoming more competent (Dimaggio & Hargittai (2001).

refers instead to, “a variety of skills associated with using ICT to find, evaluate, create, and communicate information.” Similar to the definition put forth by the ACMA, the FCC recognizes that digital literacy is the, “sum of the technical and cognitive skills people employ to use computers to retrieve information, interpret what they find, and judge the quality of that information.” This definition also includes the ability to communicate and collaborate using the Internet (FCC, National Broadband Plan).

The definition of digital literacy from the National Broadband Plan is best suited for the purposes of this collaborative learning plan. This plan’s primary focus is on the technical and intellectual skills related to utilizing ICT in the workplace, specifically the Internet. A digitally literate workforce is increasingly critical as the knowledge economy, facilitated by access to ICT, continues to grow in the United States and abroad.

## DIGITAL LITERACY, WORKFORCE, AND ECONOMIC DEVELOPMENT

A discussion of the role of digital literacy in the workforce and economic development would be remiss to exclude a discussion of the knowledge economy and the shift from a resource-driven to information-driven economy. British economist, Robert Huggins defines the knowledge economy, "… as the capacity and capability to create and innovate new ideas, thoughts, processes, and products and to translate these into economic value-added and wealth creation" (Huggins, 2002). As the economy shifts from resource-driven to information-driven, so to shifts the tools and technology required to participate in the knowledge-economy. ICT, while creating new occupations and industries, has also enhanced and transformed traditional occupations. Use of a personal computer, Internet browser, office productivity software, mobile devices, and a multitude of industry-specific applications is common throughout both traditional and knowledge-driven occupations. A digitally literate workforce with the technical and cognitive skills necessary to effectively interact with ICT to find, evaluate, create, and communicate information, then, is critical to economic development.

To examine the relationship of digital literacy to economic development, this section begins broadly with a historical examination of the knowledge economy in the United States and Michigan. This analysis is followed by a more specific look at ICT-related occupations at various skill levels, and the use of common hardware and software in the workplace.

The knowledge economy is not limited to any one or set collection of industries. While some industries rely on ICT and information more than others as the primary driver of production and wealth creation, the definition of the knowledge economy is better suited to an analysis by occupation. Richard Florida, in his seminal work, "The Rise of the Creative Class," identifies cross-sectoral occupation clusters as either "knowledge" occupations or "traditional" occupations. "Traditional" occupations are those based on traditional working-class economic ideals (Florida, 2002). Table 1 provides the list of occupations categorized as either knowledge or traditional by Florida.

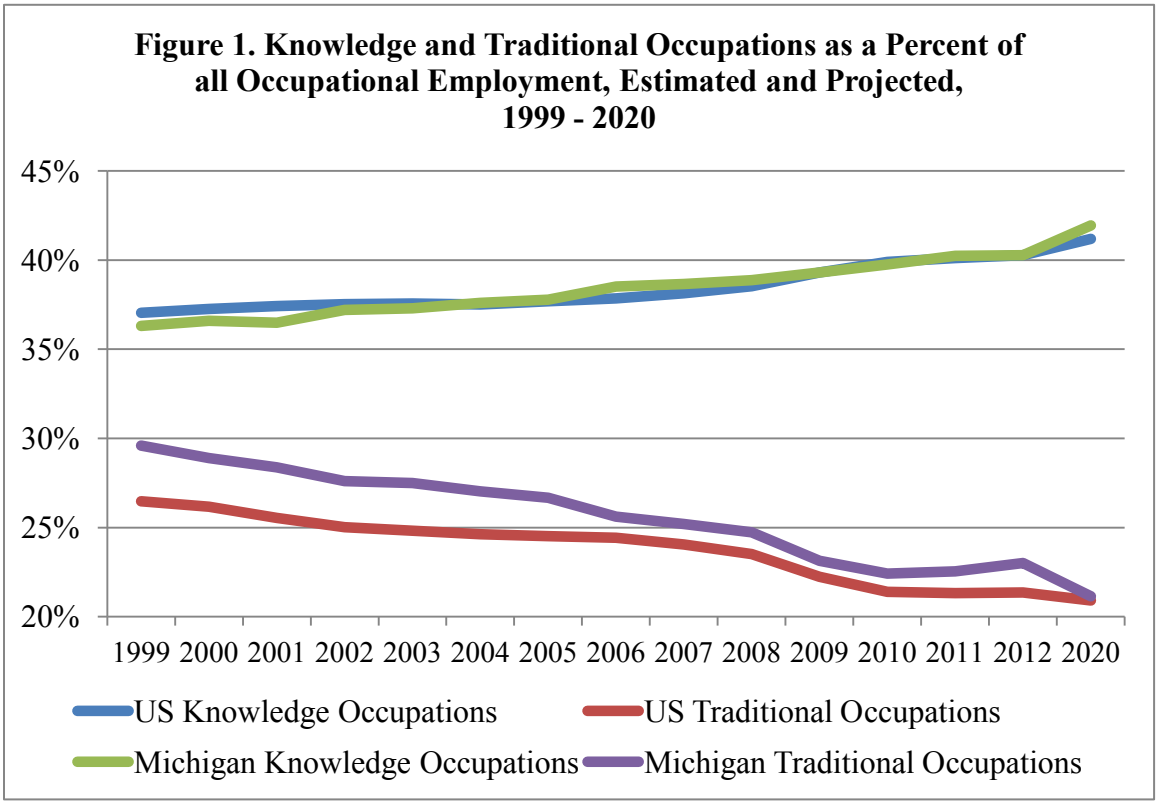
**Table 1. Knowledge and Traditional Occupational Sectors**

| Knowledge Occupation Sectors | Traditional Occupation Sectors |
|---|---|
| • Computers and Mathematics<br>• Architecture and Engineering<br>• Life, Physical, and Social Sciences<br>• Education, Training, and Libraries<br>• Arts, Design, Entertainment, Sports, and Media<br>• Management<br>• Business and Financial Operations<br>• Legal<br>• Healthcare and Technical Practitioners<br>• High-end Sales and Sales Management | • Construction and Extraction<br>• Installation, Maintenance, and Repair<br>• Production<br>• Transportation and Material Moving |

Source(s): Florida, 2002, Frederick, 2006, United States Bureau of Labor Statistics

The occupations listed in Table 1 directly correspond to occupational sectors as defined by the United States Bureau of Labor Statistics, allowing for an analysis of trends related to the knowledge economy. Over the last decade, knowledge occupations in the United States and Michigan have seen a steady increase in their share of total employment while traditional occupations have declined (see Figure 1).

**Figure 1. Knowledge and Traditional Occupations as a Percent of all Occupational Employment, Estimated and Projected, 1999 - 2020**




Source: United States Bureau of Labor Statistics, 2010 and State of Michigan Labor Market Information, 2010

In 1999, knowledge occupations, as identified by Florida, represented approximately 37% and 36% of all employment in the United States and Michigan, respectively. Given Michigan's strong manufacturing and production history, traditional occupations accounted for almost 30% of all employment in the state, compared to 26.5% of employment nationwide. The division of employment between knowledge and traditional occupations is expected to continue increasing. According to the United States Bureau of Labor Statistics 2020 occupational projections, knowledge occupations will account for 41.2% of all national employment, and nearly 42% of employment in Michigan, while traditional occupations decline to 20.9% nationally and 21.1% statewide (US BLS, 2010 and State of Michigan Labor Market Information, 2010). This analysis is useful for understanding the increasing prominence of knowledge-based occupations, generally. A more targeted method for examining ICT-related occupations from the Organization for Economic Cooperation and Development (OECD) provides a detailed look at ICT-producing and using occupations.

**OECD ICT Employment Classification**

The 2012 working paper, "ICT Skills and Employment," published by the Organization for Economic Cooperation and Development (OECD), explores the difficulty associated with defining ICT occupations and the skills associated with such employment (OECD, 2012). The OECD approaches the definition of ICT employment by examining occupations and their level of ICT utilization. ICT occupations are then classified into three categories:

1. ICT specialists, who have the ability to develop, operate and maintain ICT systems. ICTs constitute the main part of their job.

2. Advanced users: competent users of advanced, and often sector-specific, software tools. ICTs are not the main job but a tool.

3. Basic users: competent users of generic tools (e.g. office suites and Internet-related tools such as browser and email clients) needed for the information society, e-government and working life. Here too, ICTs are not the main job but a tool (OECD, 2012).

The OECD identifies 83 occupations as ICT specialists, advanced, or basic users. Of these 83, eighteen occupations are considered ICT specialists, leaving the balance of 65 occupations as advanced or basic users of ICTs. Analysis of ICT occupations by the OECD groups the Advanced and Basic User categories together. The following analysis follows this same pattern. The term "ICT Specialist" is used consistent with the OECD definition stated previously, and "ICT User" includes both Advanced Users and Basic Users as defined by the OECD. Occupations defined by the OECD were then matched to the same occupations as defined by the United States Bureau of Labor Statistics (US BLS) for the analysis found in Table 2, (see Appendix B for a full listing of occupations and ICT classification).

**Table 2. ICT Employment, Michigan and the United States, 2000 - 2020**

| Year | | 2000 | 2010 | 2011 | 2012 | 2020 |
|---|---|---|---|---|---|---|
| Michigan | Total Employment | 4,587,270 | 3,755,890 | 3,829,000 | 3,918,120 | 4,497,030 |
| | ICT Specialists | 120,340 | 110,240 | 114,270 | 93,630 | 131,770 |
| | ICT Users | 414,340 | 371,880 | 365,760 | 367,730 | 429,570 |
| | Total ICT Employment | 534,680 | 482,120 | 480,030 | 461,360 | 561,340 |
| | | | | | | |
| US | Total Employment | 129,738,980 | 127,097,160 | 128,278,550 | 130,287,700 | 163,537,100 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | ICT Specialists | 4,189,450 | 4,436,640 | 4,583,760 | 4,271,360 | 5,599,800 |
| | ICT Users | 13,328,980 | 13,324,280 | 13,300,280 | 13,516,330 | 17,045,400 |
| | Total ICT Employment | 17,518,430 | 17,760,920 | 17,884,040 | 17,787,690 | 22,645,200 |

Sources: OECD, 2012 and United States Bureau of Labor Statistics, 2012

Rates of employment of ICT Users and Specialists in Michigan consistently lag behind those of the nation as a whole. In 2000, ICT specialists comprised approximately 2.6% of employment in Michigan, and 3.2% nationally. According to the US BLS, between 2000 and 2020, the number of ICT Specialist positions is expected to grow 9.5% in Michigan and more than 33% nationally.

Similarly, ICT Users comprised 9% of occupations in Michigan in 2000, and 10.3% of those nationwide. While growth in ICT User occupations is not expected to grow as sharply as ICT Specialist positions, occupational growth for ICT Users in Michigan are projected to grow by 3.7% between 2000 and 2020 compared to nearly 28% nationally.

The economic recession that began in 2007 has greatly impacted the US economy, Michigan in particular. Occupational data for 2010, 2011, and 2012 is provided in Table 2 for context for the impact of the recession on the ICT sector. Nationally, overall ICT employment has risen slightly since 2000. However, even with marginal overall employment growth in Michigan between 2010 and 2012, total ICT employment has fallen in the state. The small uptick in ICT User occupations between 2011 and 2012 in Michigan may indicate a long-term steady increase toward the 2020 projections for these occupations; however, ICT Specialist positions saw a sharp decline during the same period.

By this data, Michigan appears to be a laggard in the opportunities for ICT occupations. However, the OECD ICT occupational definitions only include 83, or 11.1%, of the 745 occupations in the 2020 occupational projections defined by the United States Bureau of Labor Statistics. Given the wide array of occupations identified by Florida as being part of the knowledge economy, it stands to reason that many other occupations, not included in the OECD classifications, are users of ICT to varying degrees.

## O*NET Occupational Tools and Technology Descriptors

The Occupational Information Network (O*NET), developed with sponsorship of the US Department of Labor/Employment and Training Administration (USDOL/ETA), provides a database for further analysis on the importance of ICT skills in the workforce. O*NET continuously updates occupational data as it relates to the knowledge, skills, and abilities to perform a variety of activities and tasks (O*NET, 2013a). These characteristics then

comprise a standardized, measurable set of variables (descriptors) describing the various occupations in the O*NET taxonomy.

As part of the occupation descriptors, O*NET gathers data related to tools and technology used for each defined occupation. The tools and technology database attempts to identify the universe of machines, equipment, tools, software, and information technology workers may use for optimal functioning in a high performance workplace (O*NET, 2013b). As of February 2013, O*NET defines over 20,000 tools and technology for 670 occupations.

The database includes several categories of tools and technology requiring basic digital literacy skills. Four types of tools and technology, defined by O*NET, were used in this analysis: 1) Computer (laptop, desktop, or personal), 2) Electronic Mail Software, 3) Internet Browser Software, and 4) Office Suite Software (also known as productivity software). While O*NET's tools and technology database includes far more advanced and detailed computer hardware and software, these four groups represent tools and applications requiring basic digital literacy skills (see Table 3).

**Table 3. Tools and Technology Requiring Basic Digital Literacy Skills, 2013**

| Tools and Technology Definition | Occupations Requiring Tool or Technology for Optimal Performance | Percent of all Occupations with Tools and Technology Definitions (670) |
|---|---|---|
| Computer Hardware (laptop, desktop, or personal computer) | 638 | 95.2% |
| Electronic Mail Software | 351 | 52.4% |
| Internet Browser Software | 344 | 51.3% |
| Office Suite Software | 310 | 46.5% |

Source: O*NET, 2013b

Of the 670 occupations with O*NET tools and technology descriptors, 95.2% require the use of a computer for optimal performance in the workplace. Knowledge of computer hardware and peripheral equipment, operating system functionality, organizing files and data, accessing applications, and printing are a few examples of the digital literacy functions associated with basic computer use (MEL, 2013a). Similarly, computer hardware skills are necessary, then, for the use of basic software.

Over half of the occupations with O*NET tools and technology descriptors require electronic mail software for optimal performance in the workplace, and a similar percentage require Internet browser software. Email and Internet browsing represent two of the most basic uses of information and communications technology found in the definition of digital literacy from the National Broadband Plan; "to find, evaluate, create, and communicate information." Skills associated with these two software applications

can include knowledge of what the Internet is, how to search the Internet effectively, online security, email composition, email fundamentals, efficient emailing, and others (MEL, 2013a).

Office Suite Software (or office productivity software), often includes word processing, spreadsheet creation and manipulation, and presentation applications. Office productivity software allows users to create and manipulate information. Nearly 47% of occupations with tools and technology descriptors defined by O*NET require the use of office suite software to function in the workplace.

While tools and technology descriptors are not available for all occupations defined by the US BLS, (making occupational growth analysis difficult), the prevalence of occupations requiring basic digital literacy skills points to the ever increasing need for workforce development to focus on these skills. Operating a personal computer and interacting with basic productivity and communications applications is common in the workplace. Coupled with the growth of the knowledge economy and ICT Specialist and Basic and Advanced User occupations, it is evident that digital literacy training is increasingly critical to economic development in the 21st Century.

## STATE OF DIGITAL LITERACY IN MICHIGAN

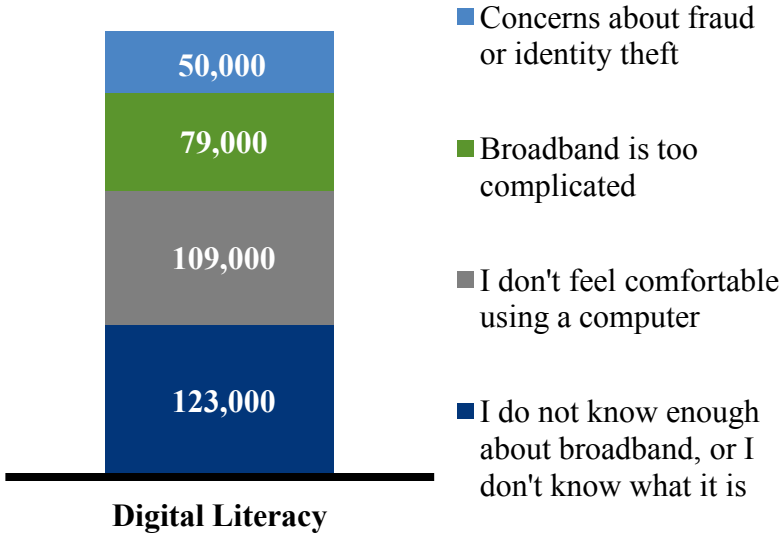
Computer and Internet use are important workplace skills for Michigan residents. As demonstrated in the earlier analysis of knowledge economy and ICT employment in Michigan and the U.S., many jobs require their employees to have some digital skills, and the number of technology intensive jobs in the nation is growing.

Digital literacy has become necessary to many individual's daily lives and work; however, many Michigan residents still lack this skill, putting them at a distinct disadvantage in the digital economy. To better understand how the digital literacy gap is distributed across the state of Michigan, and to develop a training model to bridge it, Connect Michigan conducted a residential survey in 2012 that examined the impact of digital literacy skills on broadband adoption, as well as the demographic differences amongst those who found various digital literacy skills to be a factor in adoption (for survey methodology and sample sizes, see Appendix A).

**Digital Literacy as a Barrier to Broadband Adoption in Michigan**

In 2012, 29% of Michigan adults did not subscribe to home broadband in the state. This translates into over 2.1 million Michigan adults without high speed Internet at home, including 361,000 adults in the state who do not subscribe to home broadband because of reasons related to digital literacy, or their knowledge of how to use a computer and the Internet.

**Figure 2. Digital Literacy Barriers in Michigan**

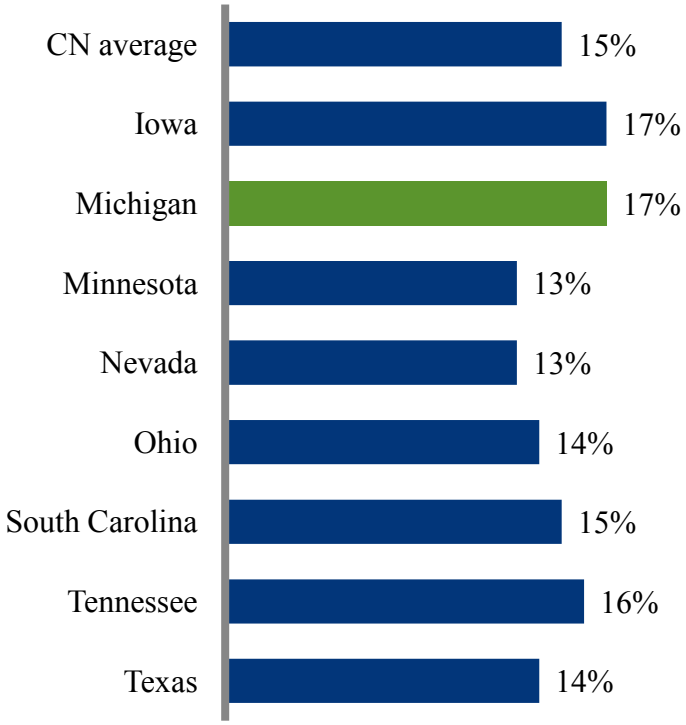



Digital literacy as a barrier to home broadband adoption was defined as a variety of factors in the 2012 Connect Michigan Residential Technology Assessment (Figure 2). This definition was informed by the FCC definition of digital literacy as a barrier to broadband adoption: non-adopters who were not comfortable with computers or were worried about bad things that could happen on the Internet (Horrigan, 2010). Approximately 123,000 Michigan adults felt that they did not know enough about broadband, or didn't even know what it was, while another 79,000 found that broadband was too complicated. An additional 109,000 simply were not comfortable using a

computer. Concerns about fraud or identify theft was also a barrier to broadband adoption by 50,000 Michigan adults.

While lack of digital literacy is not a unique challenge in Michigan, it is a more important issue compared to other states surveyed by Connected Nation. Connected Nation's 2012 Residential Technology Assessment, which surveyed residents in eight states, estimated that 15% of adults who do not subscribe to home broadband service cited digital literacy factors as the main reason for not subscribing, significantly lower than the 17% of Michigan adults who cite this as their main barrier (Figure 3).

**Figure 3: Digital Literacy as a Barrier by State**




**Digital Literacy as a Barrier (Demographic Groups in Michigan)**

Based on Connect Michigan's survey data, digital literacy as a barrier to broadband adoption can be classified as either Internet related or computer related. Michigan adults who have computer related digital literacy barriers to broadband adoption are those who say that they are not comfortable using a computer. Those with Internet related digital literacy barriers include those that find broadband to be too complicated, don't know anything about it, or have concerns about fraud or identity theft when going online (Figure 2). Across the state of Michigan, more residents without broadband cite Internet related digital literacy skills as their main barrier to adoption (12%) than computer related digital literacy skills (5%) (Table 4).

There were few statistically significant variations in digital literacy as a barrier to broadband adoption across a demographic group in Michigan, indicating that digital literacy is a universal issue in the state. However, there were several demographic subgroups in the state that cited digital literacy as a barrier at relatively high rates. There are also some significant differences in demographic subgroups that cite either Internet related or computer related digital literacy skills as a barrier.

Older adults in Michigan are more likely to lack digital literacy skills. Almost 20% of seniors (those ages 65 or older) in Michigan who have not adopted broadband cited digital literacy as a barrier. However, adults ages 45 to 64 were significantly less likely to cite digital literacy as a barrier than the statewide average. Only 14% of Michigan adults without broadband in this age group cited a digital literacy factor as their main reason for not adopting the technology.

Michigan adults without broadband ages 18 to 34 and those ages 45 to 64 are also significantly less likely to cite computer related digital literacy skills as their main barrier than the statewide average. As with overall digital literacy, seniors without broadband are significantly more likely to cite computer related digital literacy skills as their main barrier than the state average; this group is almost evenly distributed between lacking computer related (9%) and Internet related (10%) digital skills.

Cost is the overriding factor impacting broadband adoption for many low-income Michigan residents. Perhaps because of this, low-income Michigan non-adopters were significantly less likely to cite digital literacy factors as their main barrier to adoption than the statewide average. Only 13% of low-income Michigan non-adopters (those with annual household incomes less than $25,000) reported that this is their main barrier. This group is also significantly less likely to cite Internet related digital literacy as their main barrier than the state average.

Digital literacy skills, particularly Internet related skills, were a large barrier for some lower income Michigan adults. Nearly one out of four Michigan adults without the service that have an annual household income of $25,000 to $49,999 reported that digital literacy was their main barrier to adopting home broadband service. Approximately 17% of this income bracket without broadband cited Internet related digital literacy as their main barrier; both this percentage and the 7% who cited computer related digital literacy as their main barrier is significantly higher than the statewide average.

Employment is correlated with digital literacy skills in Michigan. Almost one out of five Michigan adults who are not employed and do not have home broadband (18%) found digital literacy to be the main factor barring them from subscribing to the service. This includes 22% of those that report they are not employed due to a disability and 20% who are retired. In contrast, employed Michigan adults are significantly less likely to find digital literacy to be a barrier to home broadband adoption. Only 13% of employed non-adopters cite a digital literacy factor as the main reason they do not subscribe to broadband service.

Both employed and not employed Michigan adults without broadband are similarly likely to cite Internet related digital literacy as their main barrier to adoption. Those that are not employed are more likely to cite computer related digital literacy as their main barrier. Computer related digital literacy (8%) is a significantly larger barrier amongst those that are not employed due to retirement than the statewide average.

**Table 4. Percentage of Michigan Adults Who Have Not Adopted Broadband That Report a Lack of Digital Literacy Skills as Their Main Barrier**

| | Digital Literacy | Internet Related Digital Literacy | Computer Related Digital Literacy |
|---|---|---|---|
| State Average | 17% | 12% | 5% |
| **Age** | | | |
| Age 18-34 | 16% | 14% | 2% |
| Age 35-44 | 17% | 14% | 3% |
| Age 45-64 | 14% | 12% | 2% |
| Age 65 and older | 19% | 9% | 10% |
| **Annual Household Income** | | | |
| Less than $25,000 | 13% | 8% | 4% |
| $25,000-$49,999 | 24% | 17% | 7% |
| $50,000 or more | 15% | 9% | 5% |
| **Employment Status** | | | |
| Employed | 13% | 10% | 3% |
| Not Employed | 18% | 12% | 6% |
| *Retired* | 20% | 12% | 8% |
| *Disabled* | 22% | 15% | 7% |
| *Other (unemployed, student, homemaker, or some other group)* | 11% | 11% | 0% |
| **Race/Ethnicity** | | | |
| Caucasian | 15% | 11% | 4% |
| Minority | 22% | 13% | 9% |
| **Education** | | | |
| No college education | 18% | 12% | 6% |
| College education | 14% | 11% | 3% |
| *Some college* | 11% | 10% | 1% |
| *College graduate or advanced degree* | 19% | 12% | 7% |
| **Gender** | | | |
| Female | 15% | 12% | 6% |
| Male | 18% | 11% | 4% |
| **Presence of Children in Household** | | | |
| Household with children | 14% | 14% | 0% |
| Household without children | 17% | 11% | 7% |

Digital literacy skills are also a large factor in broadband adoption amongst minorities in Michigan. Over one out of five Michigan adults without home broadband who self-identify as a member of a minority group (22%) said that a digital literacy factor is the main reason they have not adopted the service. Caucasians in the state were significantly less likely to cite digital literacy as a barrier than the statewide average; only 15% of this demographic group without broadband said that their lack of digital skills was the main factor in why they do not have home broadband service. Minorities without broadband service were also significantly more likely to cite computer related digital literacy as a barrier than the statewide average. Almost one out of ten (9%) minorities without broadband cite computer related digital literacy skills as their main barrier.

Education level is also related to digital literacy as a barrier to broadband adoption in Michigan. Only 14% of Michigan adults with a college education who do not subscribe to broadband cited a digital literacy factor as their main barrier, significantly lower than the statewide average. This included only 11% of non-adopters with only some college education, indicating that digital literacy may not be a large issue for current college students. However, almost one-fifth (19%) of Michigan adults with a college degree that do not have home broadband service cited a digital literacy factor as a main barrier. This is similar to the percentage of Michigan non-adopters with no college education (18%) who found digital literacy to be a barrier to home broadband adoption. Computer related digital literacy skills were also highest amongst those with no college education (6%) and those with college degrees (7%).

There were no significant differences in digital literacy as a barrier to broadband adoption amongst several key demographic categories in Michigan: gender, households with children, and rural status. Amongst the demographic groups in all of these categories, digital literacy as a barrier only varies by a few percentage points.

Looking at just computer related digital literacy, females without broadband are significantly more likely to cite this as a barrier than the statewide average. Households without children are also more likely to cite computer skills as a barrier, while those that do have children do not report computer skills are a barrier at all. Residents of rural counties of Michigan who do not subscribe to broadband are significantly less likely to cite Internet related digital literacy skills as a barrier to adoption than the state average.

## The Importance of Digital Literacy to Michigan's Workforce

Digital literacy skills can have an impact on an individual's life, not just in technology adoption and use, but also on their education levels, employability, and income levels. Michigan adults who lack digital literacy skills tend to have lower educational attainment levels, employment rates, and annual household incomes. In fact, only 37% of these residents had some college education, while 27% reported that they were employed, either full- or part-time, compared to the state average of 58% with at least some college education and 71% of the Michigan population that reported they had worked in the past

12 months (U.S. Census Bureau, 2011). In addition, the median self-reported annual household income for Michigan adults that lack digital literacy skills is $29,840, much lower than the U.S. Census reported median household income in Michigan of $45,981 (U.S. Census, 2011).

On the other hand, Michigan adults who have the appropriate digital skills that enable them to use the Internet at work do gain a substantial benefit from this skill. Connect Michigan's 2012 Residential Technology Assessment estimates approximately two million Michigan workers use the Internet at their jobs, and their self-reported median annual household incomes are three times higher than those who do not use the Internet at work.

**Summary**

Improving digital literacy skills is a vital task for the entire state of Michigan. Digital literacy has disconnected over 360,000 Michigan adults from the online community. Amongst these Michigan adults who lack digital literacy skills, several demographic groups cite this as a barrier at relatively high rates, including the elderly, those with annual household incomes between $25,000 and $49,999, minorities, and those that are not employed due to retirement or a disability. Many of these demographic groups even find basic computer skills to be a barrier to using broadband. This suggests that a digital literacy training program should give the top priority to these groups to expect an efficient outcome.

While Michigan is facing some digital literacy challenges that need to be diluted in the future, the portions of its workforce that are digitally literate are actually reaping some economic benefits. The median household incomes of employed Michigan adults who use the Internet at their jobs outpace those who do not use the Internet at work. Providing Michigan residents with more opportunities to learn technology skills could provide benefits to the state and its economy.

# EXPLORATION OF DIGITAL LITERACY TRAINING MODELS

Currently, there are multitudes of digital literacy training programs that exist both in Michigan and nationally. Programs run the gamut from those that are publicly funded, those that are privately funded, and those that are the result of public–private partnerships. Many programs are conducted through or at public libraries, K-12 schools, higher education institutes, and community organizations. There are several initiatives that provide free online training to the public. Several programs offer digital skill certifications to assist in participants' employability.

A large number of programs are funded through the American Recovery and Reinvestment Act Broadband Technology Opportunities Program (BTOP). This act provided $7.2 billion to the Department of Commerce's National Telecommunications and Information Administration (NTIA) to expand access to broadband services in the United States. The NTIA received $4.7 billion of this funding to support broadband infrastructure deployment, to expand and enhance computer centers for the public, to encourage sustainable adoption of broadband, and to develop the National Broadband Map. Many digital literacy training programs were awarded funds under the category of sustainable broadband adoption: "Projects that focus on increasing broadband Internet usage and adoption, including among vulnerable populations where broadband technology traditionally has been underutilized. Many projects include digital literacy training and outreach campaigns to increase the relevance of broadband in people's everyday lives." The NTIA made all grant awards with these funds by September of 2010 (National Telecommunications and Information Administration, n.d.)

## Digital Literacy Training in Michigan

No Worker Left Behind (NWLB) is a free tuition program aimed at accelerating worker job transition through education, supporting Michigan's employers and economic development needs, and accessing existing training resources. NWLB is a partnership between the Michigan Works! Association, Michigan Department of Energy, Labor & Economic Growth, and the Michigan Community College Association. The program is funded by a mix of federal training resources in several programs and the American Recovery and Reinvestment Act (ARRA). NWLB provides up to two years of tuition at any Michigan community college, university, or approved training program. Resources are available to Michigan adults who have not graduated from high school in the past two years and are not current full-time college students. Participants must be currently unemployed, have received notice of a termination or layoff, or have annual family incomes of $40,000 or less (State of Michigan, 2010).

NWLB hopes to provide Michigan workers with the appropriate skills for jobs in the emerging knowledge economy, such as those in advanced manufacturing, biotechnology, renewable energy, and other growing sectors. Participants may use funds for any

educational program that is two years or less in duration and will lead to a job in a high demand, emerging sector, or entrepreneurial endeavor. Local Michigan Works! Agencies will help participants determine high demand occupations in their region (State of Michigan, 2010).

*EveryoneOn in Michigan, Library of Michigan* – EveryoneOn in Michigan is part of the national EveryoneOn campaign, a 3-year public service campaign launched in March 2013 to promote digital literacy. The EveryoneOn in Michigan campaign is a collaboration of the Library of Michigan with Connect2Compete (C2C), the American Library Association, the Institute of Museums and Library Services (IMLS), the Online Computer Library Center, Inc. (OCLC), the Ad Council, and several private corporations. Its goal is "harnessing the digital opportunity for all Americans, regardless of race, income, geography, or education" (Library of Michigan, 2013).

The EveryoneOn in Michigan website compiles links to online digital literacy resources for the public. It also allows public libraries and other agencies to enter information on free computer training that they offer; this information is then updated on the national EveryoneOn map (Library of Michigan, 2013).

*LearningExpress Library, Michigan Electronic Library* – The LearningExpress Library provides online training in computer and Internet basics and popular software applications (Learning Express, LLC, 2013). The website is part of the Michigan eLibrary, a 24/7 online resource that gives Michigan residents access to online articles, books, digital images, and other research information (Library of Michigan, 2013a). The passive, self-paced training on the LearningExpress Library is free to any Michigan resident and includes courses on Microsoft Office applications, Adobe applications, and Windows and Macintosh operating systems. The website also provides educational resources for learners of all ages and information on improving job search and workplace skills (Learning Express, LLC, 2013).

*Connect Your Community, One Community* – This project provides computer training for citizens in several cities across the country, including Detroit, Michigan. It is funded by an $18.7 million BTOP grant and is a partnership between the Northeast Ohio organization One Community, a public-private partnership aimed at expanding high-speed broadband access and adoption, and several community organizations. (National Telecommunications and Information Administration, n.d.). In Detroit, One Community has partnered with Focus Hope, a civil and human rights organization that works to "bridge the racial divide in southeast Michigan" through food programs, career training, and community development initiatives (Focus Hope, 2013).

The program is aimed at increasing broadband adoption in low-income communities and offers courses on computer basics, Internet fundamentals, online safety, and software functionality (National Telecommunications and Information Administration, n.d.).

*Sparking Broadband Use, Eastern Upper Peninsula Intermediate School District* – This project provides digital literacy training for students, parents, and teachers in the Eastern Upper Peninsula School District. It is funded by a $5 million BTOP grant and is a partnership between the school district, Michigan WORKS!, the Tri-County Economic Development Agency, and the broadband provider Lighthouse (National Telecommunications and Information Administration, n.d.).

Computer skills and broadband training in this program are delivered through the school district's partnership with the Tri-County Economic Development Agency and Michigan Works! and focus on online connectivity, career building, government services, and education. Once participants complete the training, they are given vouchers for discounted broadband access through Lighthouse. As part of its digital literacy training, the school district has also hired an Instructional Technologist who helps teachers incorporate digital technology in their classrooms (National Telecommunications and Information Administration, n.d.).

*Broadband Adoption through Education and E-Entrepreneurship in Michigan's Urban Cores, Michigan State University* – This program was also funded through a two year BTOP grant with the goal of increasing broadband subscribership with training for high school students, displaced workers, and small businesses. It is a partnership between Michigan State University, Lansing Community College, Jackson Community College, and Allied Media Projects ((National Telecommunications and Information Administration, n.d.)

The program is located in 11 Michigan cities. In Detroit, Highland Park, and Hamtramck, the project trains high school students in web design, citizen journalism, online safety, and online business development so that they can assist local businesses and organizations in creating web content. In Lansing, the project offers adults training in broadband technology, and in Jackson, the training is focused on using existing digital literacy curricula to train unemployed industrial workers for systems administration and network installation jobs (National Telecommunications and Information Administration, n.d.).

**Digital Literacy Training throughout the United States**

*21st Century Information and Support Ecosystem: Make it Easy Where You Are, One Economy Corporation* – This $28.5 million BTOP funded program offers computer

training, wireless Internet access, broadband awareness marketing, and online content and applications to residents of 159 affordable and public housing developments and low-income communities in 50 cities and towns across the United States. One Economy is the largest non-profit dedicated to digital literacy and Internet adoption in the country. This project is a partnership between One Economy, The Broadband Opportunity Coalition, the Minority Media and Telecommunications Council, the National Association of Black Owned Broadcasters, the National Black Chamber of Commerce and over 160 corporations and not-for-profit housing and community organizations (National Telecommunications and Information Administration, n.d.).

This program provides digital literacy training through its "Digital Connectors" program, a partnership with Comcast that helps young adults ages 14 to 21 in low-income neighborhoods become computer and broadband literate by training them to teach digital literacy. Topics covered in this program include digital literacy, financial literacy, community mapping, hardware and networks, software and programming, and media production and civic journalism (Mitchell, 2010). Digital Connectors participate in training two to three times per week at a school, community center, or affordable housing development. They then commit to several hours each month volunteering at community organizations, senior centers, churches, local schools, and with families and friends (Comcast, 2013).

*Digital Literacy.gov, American Library Association and National Telecommunication and Information Administration* – DigitalLiteracy.gov is a partnership between the American Library Association and the Department of Commerce's National Telecommunications and Information Administration (NTIA). The website is a portal that collects and shares digital literacy class materials, research, and online learning tools (Sheketoff, 2011).

*KEYSPOT, Freedom Rings Partnership* – The Freedom Rings Partnership offers free computer use, Internet access, and training at its KEYSPOT computer center locations, primarily in North, South, and West Philadelphia neighborhoods. The Partnership is made up of grassroots organizations, governments, and universities interested in bringing Internet access, training, and technology to communities throughout Philadelphia (Freedom Rings Partnership, 2011).

There are 77 KEYSPOT's in the city at recreation centers, community-based organization sites, homeless shelters, affordable housing sites, and mobile labs. Training offered is focused on both digital literacy and workforce training (National Telecommunications and Information Administration, n.d.).

*MOUSE* – MOUSE (formerly Making Opportunities for Upgrading Student Education) is a New York City based non-profit that trains high school students to become digital media and technology experts in schools. The program was founded in 1997 and currently works with over 4,200 students at 377 sites in New York, California, Illinois, and Texas (MOUSE, 2013).

The MOUSE Squad program trains students to become the technology support team at their high schools. Students can also become part of a MOUSE Corps, which provides design and technology training through professional mentors and internships. An online MOUSE Help Desk Curriculum is also accessible in over 50 countries (MOUSE, 2013). A MOUSE Squad help desk costs approximately $5,000 to operate per school each year and could save a school up to $19,000 in technology support costs compared to a school without a MOUSE Squad (New York City Comptroller, 2013). After participating in MOUSE, 84% of students reported that they are better prepared for careers, 81% are more likely to attend college, and 79% are more motivated to pursue careers involving technology (MOUSE, 2013).

*Public Adoption through Libraries: Every Community Online, Connected Nation, Inc.* – This $6.9 million program is BTOP funded and offers digital literacy training sessions at libraries, community colleges, and other community anchor institutes throughout the state of Ohio. The project is run by Connect Ohio, a subsidiary of Connected Nation, with the goal of encouraging broadband adoption in Ohio.

The digital literacy training includes instruction on the use and maintenance of computer components, Internet use, and practical Internet applications. Training is offered at community anchor institutes throughout the state. Local digital literacy trainers are used to reduce travel and orientation costs, to allow training to begin soon after a community anchor institute is engaged with the program, and to take advantage of the local workforce. Users that complete the training are able to take advantage of special offers for home broadband service from local broadband providers. The project uses a statewide advertising campaign that includes radio and television advertisements. One aim of the project is to provide training to Ohio's economically vulnerable residents, including minorities, low-income citizens, senior citizens, and residents of rural areas (National Telecommunications and Information Administration, n.d.).

*Train the Trainer, Idaho Commission for Libraries* – The Train the Trainer program is a partnership between the Idaho Commission for Libraries and the Idaho Office for Refugees that trains foreign language speakers to teach digital literacy to others in their language groups. The program is supported by a project grant from the Online @ your library BTOP program (American Library Association, 2012).

Train the Trainer teaches new Americans to use library tools for digital literacy skills training. These trainers then offer workshops and one-on-one sessions on using library resources. The trainings utilize tools available through LiLI.org (Idaho's statewide database program) and the Online @ your library project. Public libraries are used for the majority of the sessions but some take place at locations such as coffee shops, computer labs, and community meeting rooms (American Library Association, 2012).

*International Computer Driving License Testing Centers, Bay Area Information Technology Consortium* – The Bay Area Information Technology Consortium (Bay ITC) partnered with IBM in 2004 to adopt the International Computer Driving License (ICDL) by opening ICDL testing centers throughout the Bay Area. The program is available to community colleges, K-12 partners, workforce investment boards, and businesses throughout California. Bay ITC is a consortium of twenty six California Bay Area community colleges and high technology businesses interested in education innovation and IT reform. ICDL is the world's leading credentialing program for computer literate, skilled workers and is used in over 130 countries (PRNewswire, 2004).

*Information and Communication Technology job retraining pilot program, Certiport* – Certiport, a company that provides training, assessment, and certification solutions, partnered with the University of North Alabama (UNA), ACT, Kempster Group, and CompTIA in 2005 to retrain displaced textile workers in the Tennessee River Valley. The pilot program certified 58% of participants with the Certiport Internet and Computing Core Certification, a global certification in digital skills (Pilmer, 2005).

The pilot program used UNA instructors, twice weekly night classes, and digital skills pre-assessment to help students focus their studies. The program took place over a two month period and cost approximately $1,600 per student (Pilmer, 2005).

*Project Endeavor, Communication Services for the Deaf, Inc.* – Project Endeavor is a national project targeting low and middle income deaf and hard of hearing individuals throughout the United States. The program has sites in all 56 U.S. States and Territories and is a partnership between the non-profit Communication Services for the Deaf, Inc., and two private sector data and communications businesses, CoSentry and SDN Communications (National Telecommunications and Information Administration, n.d.). The project is funded by a two year BTOP grant of almost $15 million which concluded at the end of 2012 (Communication Services for the Deaf, 2012).

This goal of Project Endeavor is to provide discounted broadband service and specialized computers, technology training, public access to videophones at anchor institutes, and nationwide outreach (National Telecommunications and Information Administration,

n.d.). Technology training is provided through online videos and encompasses both broadband training and support and technology and job skills training (Communication Services for the Deaf, 2010-2011).

# PROPOSED MODEL FOR ENHANCING DIGITAL LITERACY TRAINING OPPORTUNITIES IN MICHIGAN

Basic digital literacy skills are vital to success in the workplace. Given this criticality, this research aims to develop a local model for strengthening, creating, and building awareness for the importance of workplace digital literacy skills and for existing or new digital literacy training programs based on the following points:

- More than 95% of occupations require the use of a laptop, desktop, or personal computer, and more than 50% require the use of email or Internet browser software (O*NET, 2013b).
- Approximately 361,000 adults in Michigan cite digital literacy as the primary barrier to home broadband adoption. Most adults citing digital literacy as a barrier indicate Internet-related concerns (12%), while 5% cite issues with computer-related skills.
- Roughly two million Michigan workers use the Internet at their jobs, and their self-reported median annual household incomes are three times higher than those who do not use the Internet at work.

The Broadband Technology Opportunities Program (BTOP) administered by the National Telecommunications and Information Administration has provided several national, state, and local best practice examples of innovative digital literacy training programs. Coupled with widely available online digital literacy training curricula, it is possible for communities to closely examine local digital literacy issues and develop awareness, outreach, and training programs to address them. The following outlines a suggested framework for implementing a local taskforce to increase digital literacy skills. The model focuses on establishing a local taskforce, establishing the need locally, inventorying assets and resources, creating partnerships, building awareness, and developing support networks.

*1. Select a taskforce organizer and gather stakeholders*

Workforce training and economic development are critical in Michigan, given the recent economic recession. Several agencies at all levels of government are working to address issues related to workforce and economic development across the state, (a sample list is found below). Cooperation and collaboration among these entities at a local level is key to furthering a unified mission of reducing digital literacy as a barrier to employment and furthering of ones' job skills. This task is envisioned through the creation of a local taskforce of stakeholders charged with facilitating a process that will move forward a joint vision for increasing the digital literacy of the community. Given the wide regional and local variations among Michigan's communities, a county-level or multi-county definition of community may work for rural areas of the state, while city or multi-city collaborations may better serve denser areas.

Identifying a taskforce organizer and gathering local stakeholders and resources are the first steps to creating a digital literacy training taskforce. The taskforce organizer should be an organization whose mission is focused on workforce or economic development. The taskforce members, and taskforce organizer, should include organizations such as, but not limited to:

- Michigan Works! offices
- Regional representatives of the Michigan Economic Development Corporation
- Local libraries
- K-12 schools
- Local non-profits addressing digital literacy or workforce development
- Higher education institutions, including community colleges
- Michigan skills alliances
- Local and regional economic development organizations
- Vocational education centers
- Local unemployment offices
- Chambers of commerce

A diverse group of stakeholders allows for greater collaboration, incorporation of differing perspectives, and sharing of resources. The taskforce organizer could be any of the above mentioned stakeholders, but local context will dictate the taskforce structure. The taskforce organizer is responsible for identifying and recruiting team members, facilitating meetings, soliciting additional community involvement, and moving the team through the process of developing a strategy for increasing digital literacy.

*2. Assess the need*

While statewide research defines issues related to digital literacy at a macro scale, local efforts will benefit from a more detailed analysis of skills, barriers, and needs. For the purposes of this model, the needs assessment has two components: 1) analysis of digital literacy skills and gaps in the workforce, and 2) an analysis of the skills in demand and deficiencies in digital skills of current employees as perceived by local employers. This two-fold analysis provides a "supply" and "demand" style needs assessment examining the digital literacy of the current workforce, (supply), and the desired digital skills and shortages identified by employers, (demand).

Data gathering methods should be implemented that are convenient for the general workforce and employers. Various taskforce members, including Michigan Works!, could implement digital literacy self-assessment tools for the general workforce at Michigan Works! offices, local libraries, or state unemployment offices. Surveys designed to gather the demand-side of the local digital literacy landscape can be gathered by local chambers of commerce and economic development offices that have regular

contact with employers in the community. Survey questions should focus on gathering information related to both Internet and computer related digital literacy issues.

*3. Inventory programs and resources*

Next, the taskforce will need to establish an inventory of local and regional digital literacy training assets and resources. This can be done following, or concurrently with, the needs assessment. Members of the taskforce can provide an inventory of the digital literacy training resources they offer, but resources may be found outside the organizations that comprise the taskforce. The taskforce may need to conduct further research into the existence of digital literacy-related non-profit organizations or recent funding awards (i.e. BTOP). Along with a listing of established training programs and resources, the inventory should also include a comprehensive inventory of local organizations and individuals with the interest and skill to potentially train individuals. Assets can also include locations and facilities with the capacity to host digital literacy training events.

Since, most often, multiple agencies provide digital literacy or related training in a community, it may be best for the taskforce to create an online, or hard copy, repository of these programs that the public can easily access. This will reduce confusion regarding which agency offers which service and vice versa. Such a repository also gives the taskforce a single place to point those interested in training through awareness and outreach materials developed later in the program.

*4. Identify gaps and develop programs and partnerships*

Following the local needs assessment of the workforce and employers, and the inventory of existing training programs and resources, the taskforce can then identify gaps in current training offerings. Taskforce members can work among themselves, and with additional partners as needed, to create, develop, and execute new programs to fill these gaps.

Taskforce members will need to exercise creativity and leverage existing local assets to develop programs that increase the digital literacy of the workforce in the community. The taskforce is designed to bring workforce and economic development experts from across the community, together with others who may be just outside this focus sphere. These dynamics can lead to more creative and vibrant programs that would not have been created otherwise.

While the assessment of local digital literacy needs will be identified through the assessment completed by the taskforce, the team should pay special attention to vulnerable groups, identified through statewide research, as having greater digital literacy barriers than others. Statewide research shows that adults over the age of 65, households with incomes between $25,000 and $50,000 annually, those that are retired or disabled, the unemployed, and minority populations identify digital literacy as the primary barrier

to technology adoption more often than the state average (see Table 4). These populations should be given extra consideration, along with any others identified through the local digital literacy assessment.

When developing new programs in the community, it may be prudent to consider those that also address the cost barrier to computer ownership and home broadband subscription. Connect Michigan's statewide data on digital literacy relates to those who do not subscribe to broadband at home, many of whom do not own a computer. There will most likely be a need for a computer and home broadband subscription if a non-adopting individual seeks and completes digital literacy training. Local training programs that include an opportunity for trainees to obtain a reduced cost computer and home broadband subscription can lead to more sustainable technology adoption by simultaneously addressing both digital literacy and cost barriers. Partnerships with local broadband providers, and other technology groups, may be an option for providing these incentives to trainees. The Eastern Upper Peninsula Intermediate School District BTOP project, described previously, offers a model for this type of partnership.

*5. Build awareness*

While the delivery of digital literacy training to individuals is the focus of the taskforce, it will be equally as important for the team to build awareness and conduct extensive outreach to support these programs in the community. Outreach and awareness efforts should have two purposes: 1) to inform the public of the digital literacy programs available to them in the community, and 2) to establish and instill the importance of being digitally literate. Videos, booths at community events, flyers, and information in community newsletters are just a few ways the taskforce could build awareness for digital literacy locally.

Content for awareness campaigns could come from testimonials of training participants or from employers who are looking for employees with digital skills. Partnerships with communications programs at K-12 schools or higher education institutions could assist with production. Outreach through taskforce member public points of contact, (i.e. unemployment or Michigan Works offices, community centers, etc.) can provide the individuals with opportunities to gather information and seek training.

The EveryoneOn in Michigan campaign from the Library of Michigan, (described previously), is a statewide effort to build the awareness for existing digital literacy training opportunities and the importance of being digitally literate. Taskforces could build upon and promote this effort locally as a way to jumpstart awareness efforts by capitalizing on and leveraging an existing resource.

*6. Develop support networks and reassess the need*

Digital literacy is not a one-time event for an individual. New software is continuously developed, existing software changes and requires updates, and new technology and

platforms emerge which can continue to add to the digital literacy challenge. Local support networks could help boost the sustainable digital literacy of trainees in the community. Continuing support for trainees could include user groups gathering at local libraries, online discussion forums, or a community technology support help line.

Given the continuously changing nature of technology, it will be important for the taskforce to establish metrics for long term tracking in order to reassess the digital literacy needs of the community. Exit surveys, scheduled outreach with trainees, and regular meetings with employers to understand their changing skill needs will help ensure the taskforce is developing and promoting digital literacy programs that meet local needs.

development including Michigan Works, local libraries, economic development organizations, and others. These organizations and their resources can be organized into a taskforce to guide a process aimed at increasing digital literacy and its awareness.

- Assess the need: While statewide research has identified a gap in digital literacy among all adults, and higher rates among certain demographic groups, digital literacy needs will vary by location. The taskforce can use various data gathering techniques to assess the supply (digital literacy of the workforce) and demand (digital literacy needs of employers) of digital skills in the community.
- Inventory programs and resources: As stated previously, most communities have multiple agencies and organizations working to address digital literacy. These programs, however, can be uncoordinated. By creating an inventory of resources and cataloging them into a single location, the taskforce can begin to identify gaps in current training curricula.
- Identify gaps and develop programs and partnerships: The taskforce brings together a diverse group of stakeholders around the mission of improving the digital literacy of the community. By combining the needs assessment and resource inventory, the taskforce can determine if gaps in current training offerings exist. The taskforce can then work to create, develop, and promote new training initiatives to address the local need.
- Build awareness: The taskforce should work to: 1) increase the awareness of digital literacy training programs and opportunities, and 2) establish and instill the importance of being digital literate. Both activities are equally important to creating and maintaining digital literacy training activities.
- Develop support networks and reassess the need: Digital literacy is not a one-time event for an individual. The taskforce should work to create formal or informal support networks to assist trainees with sustainable adoption of technology and maintain relevant skills.

In conclusion, while digital literacy is not the primary barrier to home broadband adoption in Michigan, it can be a major barrier to succeeding in the workplace for those lacking digital skills. The importance of digital literacy in the workplace will continue to increase as the economy becomes more dependent on ICTs for job and wealth creation. Local taskforces comprised of stakeholders charged with improving workforce and economic development can help to improve the digital literacy skills of Michigan's workforce through a process of assessment, inventory, partnerships, and awareness.

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# CONCLUSION

A digital literate workforce is becoming increasing critical as the economy continues to shift from one of resource intensity to one based on knowledge and information, and its rapid development and transfer. Information and communications technology (ICT) is an important factor contributing to the economic viability of the state and nation, and a skilled workforce is needed to find, create, evaluate, and communicate information via technology.

Those without basic digital literacy skills are often left out of the workforce as the number of occupations reliant on this skill set continues to increase. Michigan, and the nation, is projected to continue to see increases in the proportion of jobs in knowledge economy occupations. Nationally, the numbers of jobs in ICT specialist and user occupational classifications is expected to grow significantly by the year 2020. While the definitions of ICT specialist and user occupations are quite narrow, the Occupational Information Network (O*NET) indicates that more than 95% of occupations require the use of a computer and more than 50% require the use of e-mail or internet browser software. Without basic digital literacy skills, more and more individuals are ineligible to take jobs in growing sectors.

More than 360,000 Michigan adults state that some form of digital literacy issue is their primary barrier to adopting broadband technology at home, leaving them at a distinct disadvantage in the workplace. Populations with more significant digital literacy issues than others include adults over 65 years of age, lower income households (those earning between $25,000 and $50,000, annually), retired and disabled adults, and minorities. Households lacking digital literacy skills report median annual incomes lower than that of the median annual income for the state, and self-reported median annual incomes for adults that have the digital skills to use the Internet at their jobs are three times higher than those who do not use the Internet at work.

Federal and state governments have focused heavily on increasing the digital literacy of the workforce. From the Broadband Technology Opportunities Program of the National Telecommunications and Information Administration to a myriad of state-based initiatives, digital literacy has and continues to be a critical economic development topic. While these efforts, and others, have succeeded in training individuals and providing best practice examples for others, there are still those lacking this important skill set.

By gathering together stakeholders, resources, and assets, this research proposes a model for communities to address local digital literacy issues. Many statewide organizations address workforce and economic development issues individually, and collaborations among them often exclude organizations with similarly aligned goals. The model follows six primary steps:

- Select a taskforce organizer and gather stakeholders: Communities often have several agencies or organizations tasked with supporting workforce and economic

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# APPENDIX A

**Survey Methodology**

Between October 4 and November 4, 2012, Connect Michigan conducted a random digit dial telephone survey of 1,201 adult heads of households across the state. Of the 1,201 respondents randomly contacted statewide, 200 were called on their cellular phones, and 1,001 were contacted via landline telephone. Once the respondent agreed to participate, these surveys took approximately eleven (11) minutes to complete.

At least four attempts were made to reach an adult at each working telephone number on different days of the week and at different times of the day to increase the likelihood of contacting a potential respondent. To ensure that the sample was representative of the state's adult population, quotas were set by age, gender, and county of residence (to ensure that a sufficiently large sample of adult heads of rural households, these households were oversampled). The results were then weighted to coincide with 2010 United States Census population figures.

For the purpose of setting quotas and weighting, "rural" respondents are defined as living in a county that is not a part of a Metropolitan Statistical Area (MSA), as designated by the United States Office of Management and Budget. Surveys were conducted by Thoroughbred Research Group, located in Louisville, KY, in English. Based on the effective sample size, the effective post-weighting margin of error = $\pm$ 3.07% at a 95% level of confidence for the statewide sample. As with any survey, question wording and the practical challenges of data collection may introduce an element of error or bias that is not reflected in this margin of error.

Rim weighting was applied to correct for minor variations and ensure that the sample matches the most recent U.S. Census estimates of the state's population by age, gender, and urban/rural classification of the respondent's county of residence. In addition, Connect Michigan oversampled adult heads of households who identified themselves as Hispanic, Latino, or of Spanish origin to ensure a large enough sample size of this demographic group for reporting purposes. Weighting and research consultation were provided by Lucidity Research, LLC.

Connected Nation conducted similar surveys in 8 states in 2012: Iowa, Michigan, Minnesota, Nevada, Ohio, South Carolina, Tennessee, and Texas.

This residential survey was conducted as part of the State Broadband Initiative (SBI) grant program, funded by the National Telecommunications and Information Administration (NTIA). The SBI grant program was created by the Broadband Data Improvement Act (BDIA), unanimously passed by Congress in 2008 and funded by the American Recovery and Reinvestment Act (ARRA) in 2009.

**Select Sample Sizes**

| 2012 Connect Michigan Residential Technology Assessment | Connected Nation Average (n) | Michigan (n) |
|---|---|---|
| **Total** | 9,607 | 1,201 |
| Subscribe to broadband | 6,764 | 855 |
| Do not subscribe to broadband | 2,843 | 346 |
| **Demographic Categories** | **Michigan respondents who do not subscribe to home broadband (n)** | |
| Age 18-34 | 61 | |
| Age 35-44 | 33 | |
| Age 45-64 | 127 | |
| Age 65 and older | 125 | |
| Households with annual incomes less than $25,000 | 135 | |
| Households with annual incomes of $25,000-$49,999 | 87 | |
| Households with annual incomes of $50,000-or more | 54 | |
| Employed | 117 | |
| Not employed | 217 | |
| • Retired | 129 | |
| • Disabled | 50 | |
| • Unemployed, homemaker, or student | 37 | |
| Caucasian | 266 | |
| Minority | 57 | |
| No college education | 182 | |
| College education | 153 | |
| • Some college | 94 | |
| • College graduate or advanced degree | 59 | |
| Male | 147 | |
| Female | 199 | |
| Household with Children | 65 | |
| Household without Children | 267 | |
| Rural | 134 | |
| Non-Rural | 212 | |

# APPENDIX B

| ICT Specialist Occupations, OECD 2012 |
|---|
| Computer and information systems managers |
| Computer scientists and systems analysts |
| Computer programmers |
| Computer software engineers |
| Computer support specialists |
| Database administrators |
| Network and computer systems administrators |
| Network systems and data communications analysts |
| Operations research analysts |
| Computer hardware engineers |
| Electrical and electronic engineers |
| Computer operators |
| Computer, automated teller, and office machine repairers |
| Radio and telecommunications equipment installers and repairers |
| Electrical and electronics repairers, industrial and utility |
| Telecommunications line installers and repairers |
| Electrical, electronics, and electromechanical assemblers |
| Computer control programmers and operators |

| ICT User Occupations (Advanced and Basic Users), OECD 2012 | |
|---|---|
| Advertising and promotions managers | Management analysts |
| Marketing and sales managers | Accountants and auditors |
| Public relations managers | Budget analysts |
| Financial managers | Credit analysts |
| Human resources managers | Financial analysts |
| Purchasing managers | Personal financial advisors |
| Wholesale and retail buyers, except farm products | Insurance underwriters |
| Financial examiners | Architects, except naval |
| Loan counselors and officers | Surveyors, cartographers, and photogrammetrists |
| Financial specialists, all other | Aerospace engineers |
| Actuaries | Agricultural engineers |
| Mathematicians | Biomedical engineers |
| Statisticians | Chemical engineers |
| Miscellaneous mathematical science occupations | Civil engineers |
| Environmental engineers | Atmospheric and space scientists |
| Industrial engineers, including health and | Chemists and materials scientists |

| | |
|---|---|
| safety | |
| Marine engineers and naval architects | Environmental scientists and geoscientists |
| Materials engineers | Physical scientists, all other |
| Mechanical engineers | Economists |
| Mining and geological engineers, including mining safety engineers | Market and survey researchers |
| Nuclear engineers | Urban and regional planners |
| Petroleum engineers | Lawyers, judges, magistrates, and other judicial workers |
| Engineers, all other | Archivists, curators, and museum technicians |
| Agricultural and food scientists | Librarians |
| Biological scientists | First-line supervisors/managers or retail sales workers |
| Conservation scientists and foresters | Fire-line supervisors/managers of non-retail sales workers |
| Medical scientists | Insurance sales agents |
| Astronomers and physicists | Securities, commodities, and financial services sales agents |
| Telemarketers | Word processors and typists |
| Tellers | Desktop publishers |
| Brokerage clerks | Insurance claims and policy processing clerks |
| Secretaries and administrative assistants | Electrical power-line installers and repairers |
| Data entry keyers | |

# About REI

The MSU EDA University Center for Regional Economic Innovation (REI) seeks to identify and develop new economic development tools, models, policies and practices to support innovative economic development high-growth enterprises and job creation in distressed regions across the state. REI has established a new economic development ecosystem to cope with the ever-changing global and regional dynamic. Through this ecosystem, we engage innovative and creative minds which result in new economic development practices.

The REI University Center was established in 2011 with support from the U.S. Department of Commerce, Economic Development Administration, and in collaboration with the following MSU offices:

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