Human Performance Technology:

Concepts, Methodologies, Tools, and Applications

Information Resources Management Association
USA

IGI Global
DISSEMINATOR OF KNOWLEDGE

Published in the United States of America by
IGI Global
Business Science Reference (an imprint of IGI Global)
701 E. Chocolate Avenue
Hershey PA, USA 17033
Tel: 717-533-8845
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Library of Congress Cataloging-in-Publication Data

Names: Information Resources Management Association, editor.
Title: Human performance technology : concepts, methodologies, tools, and applications / Information Resources Management Association, editor.
Description: Hershey, PA : Business Science Reference, [2019]
Identifiers: LCCN 2018053267| ISBN 9781522583561 (hardcover) | ISBN 9781522583578 (ebook)
Subjects: LCSH: Performance technology.
Classification: LCC HF5549.5.P37 H86 2019 | DDC 658.3/12--dc23 LC record available at https://lccn.loc.gov/2018053267

British Cataloguing in Publication Data
A Cataloguing in Publication record for this book is available from the British Library.

The views expressed in this book are those of the authors, but not necessarily of the publisher.

For electronic access to this publication, please contact: eresources@igi-global.com.

Chapter 42
Digital Citizenship for All:
Empowering Young Learners With Disabilities to Become Digitally Literate

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ABSTRACT

Digital literacy is important, particularly for young people as they prepare for college and a career in modern society. From computer-based tests used to measure student progress on college applications and online job applications, the transition to college and career requires the use of technology. Individuals must have digital literacy skills to fully participate and contribute on the job and at school. This includes people with disabilities. These young adults have aspirations for jobs and higher education just like others their age and therefore deserve to be taken seriously. This article is a review of literature that explores what it means to be digitally literate, the digital literacy experience for young adults with disabilities, and the implications for education and the workplace. It also proposes instructional solutions to aid in the preparation of young adults for college and career.

DOI: 10.4018/978-1-5225-8356-1.ch042

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INTRODUCTION

Scholars have studied digital literacy for decades. As a result, multiple models have been developed to describe and explain the phenomenon. Margaret Spencer (1986) and then Paul Gilster (1997) were the first to introduce the concept of digital literacy (Buckingham, 2015). Subsequent researchers have since expanded upon this early work (Koltay, 2011; Knobel & Lankshear, 2006; Merchant, 2007; Russo, Watkins, & Groundwater-Smith, 2009). The early definitions focused mostly on technical skills because computer use at the time was primarily for basic "operational skills" (e.g., calculations and word processing). Now that computers are more advanced, mobile, and used in a variety of ways day-to-day, more recent definitions often include higher-level cognitive processes such as communication skills and critical thinking skills (Belshaw, 2012; Dede, 2010; Ferrari, 2012; Janssen et al., 2013; Neumann, Finger, & Neumann, 2017; O'Connor et al., 2002; Scott, 2007). An often cited more expansive definition by Eshet-Alkalai (2004), claims that "digital literacy involves more than the mere ability to use software or operate a digital device; it includes a large variety of complex cognitive, motor, sociological, and emotional skills, which users need to function effectively in digital environments" (p. 93). Along with expanding the definition, experts have argued that digital literacy is not a singular entity, but instead a combination of intertwined skill sets, competencies, and attitudes (Bawden, 2008; Hattie, 2009).

More recently, though, Belshaw (2012) has argued that Eshet-Alkalai's conception of digital literacy does not account for how digital literacy changes as digital tools and contexts change over time. Belshaw instead conceptualizes digital literacy as lying on a continuum with skills broken down into levels, akin to The Levels of Digital Literacy Model created as part of the DigEuLit Project (Martin & Grudziecki, 2006). Low-level skills, sometimes called functional digital literacy skills, are learned quickly with practice and feedback. Higher level-skills are more complex and take time to develop. Belshaw believes that these skills are difficult to develop in a one-time, non-contextualized instructional experience. In parallel, Eshet-Alkalai (2012) updated the model to include "real-time-thinking"; this update recognizes that people need to be more adept at processing and evaluating large quantities of information due to the pervasive nature of the internet.

It is clear from the literature that digital literacy is complex and evolving, and, as such, a difficult concept to pin down. Two recurring themes arise in the literature. One theme is that digital literacy changes as technology changes; therefore, it must be continually defined and redefined. The second theme suggests that no definition accurately defines digital literacy for every organization and setting (Belshaw, 2012, p. 44). Given this, we summarize simply that digital literacy is the acquisition of skills and abilities necessary to communicate and navigate within current and emerging technologies. Albeit brief, as new technologies produce new skills, this definition is sustainable and is applicable in the career and the workplace context congruent with the focus of this paper (Buckingham, 2015; Gilster, 1997; Reed, 2010; Spencer, 1986; U.S. Department of Labor, 2016).

WHY DO DIGITAL LITERACY SKILLS MATTER?

In the United States, recent legislation called the Workforce Innovation and Opportunity Act (WIOA), has highlighted the importance of digital literacy skills in the workplace (U.S. Department of Labor, 2016). The skills used to read, understand, and navigate information online have become essential in recent years because the tools in the workforce continue to change. According to a report conducted by

the World Economic Forum, technological advances in the next few years will impact all types of work (World Economic Forum, 2016). In fact, Schwab (2017) argues that we are now entering a new age of work, which he labeled "the 4th Industrial Revolution." This shift in the workplace is characterized by "a fusion of technologies that is blurring the lines between the physical, digital, and biological spheres" (Schwab, 2017, p. 99). The shift is more than the introduction of new tools and technologies, but also the reality that digital is becoming embedded in society, impacting how individuals learn, work, and socialize.

Digital skills are not only necessary to perform day-to-day functions in the workplace, but they are also essential to simply enter the workplace because much of the job application process is now completely digital (Kavanagh & Johnson, 2017; Westfall & Zeller, 2014). With a competitive job market, recruiters use the internet to reach a wider pool of prospective job candidates. Recruiting online allows for shortened timelines for recruiting, evaluating, and hiring versus conventional paper and pencil methods. In addition, candidates who successfully use digital tools in the application process are increasing their chances of selection by demonstrating their digital skills to recruiters. The U.S. government recognized the changes in workforce recruitment and skills by identifying the digital literacy skills needed to enter workforce, which include basic academic skills, critical thinking skills, and self-management skills needed "for successful transition into and completion of postsecondary education or training, or employment" (U.S. Department of Labor, 2016, p. 128). To emphasize the criticality of this, employers are now more prescriptive of the required digital literacy skills needed for employment, which is not easily done, since these skills need to be learned in authentic contexts in order for them to be most effective (Hattie, 1987). For example, Withers et al. (2015) noted in a case study of job-seeking learners at Portland State University that "digital skills are required to look and apply for jobs, even if those jobs do not require digital skills on a daily basis" (p. 4). Thus, with online job boards and application submission processes, digital literacy skill development must precede employment consideration.

Digital Skills Gap

After discussing the definition and importance of digital literacy skills for employment, it is worth describing how digital literacy skills are developed. People become digitally literate both inside and outside of the classroom. Although it is common for young children to experience technology before even walking, most kids begin to learn digital literacy skills in school. Children first begin learning how to use technology informally by observing those around them (Plowman, Stevenson, McPake, Stephen, & Adey, 2011; Plowman, McPake, & Stephen, 2008). They not only learn these early digital skills through observation and practice but also by adopting "shared social practices with family and friends" (McTavish, 2009, p. 21). Parents also influence children's attitudes and interest in technology (Lankshear & Knobel, 2011). However, how children's digital literacy skills develop over time depends on a number of internal and external factors including access to technology, self-efficacy, number of hours spent using technology, and support from parents and teachers (Ba, Tally, & Tsikalas, 2002).

While there is not a commonly accepted measure of digital fluency, some researchers have studied students' perceptions of their own digital literacy skills. In one study, Kaminski, Switzer, and Gloeckner (2009) found that students' self-reported proficiency with some digital skills diminished from entry to completion of their undergraduate studies. The study measured students' perception of their fluency with technology by surveying incoming freshmen and then surveying the senior class four years later. While perceptions of fluency increased in basic skills--such as using presentation software and spreadsheets--the researchers discovered students did not engage in enough advanced applications. Specifically, students

did not have as much experience creating original content based on what they were learning using digital tools (Kaminski et al., 2009). This is significant because a number of digital literacy definitions and frameworks address application skills and the ability to synthesize information in digital environments and basic technology functions (Belshaw, 2012; Dudeney & Hockly, 2016; Eshet-Alkalai, 2004; Kurtz & Peled, 2016). We are interested in how this gap in skills manifests for young adults with disabilities.

For students with disabilities, a gap in digital skills is sometimes referred to as the disability digital divide; this refers to the difference in access to computers and the internet between those with disabilities and those without (Gorski & Clark, 2002). Kim and Doh (2006) identify disability as both a direct and indirect cause of this divide. The direct aspect is how the disability itself affects a person's ability to see, hear, or manipulate devices. People experience difficulties using technology when they are unable to read text on a screen due to vision impairment, unable to hear audio in video explanations with hearing loss, or unable to use functions that require clicking or using a button for individuals with limited dexterity. Indirectly, people with disabilities are impacted by low income and limited education and career opportunities (Kim & Doh, 2006). Later research by Vicente and Lopez (2010) supports that finding, showing that people with disabilities are less likely to use the internet due to the added costs for adaptive technology tools. An individual is less prepared to use digital tools that are not easily accessible. Kim and Doh (2006) add, however, that the socioeconomic factors are only part of the cause. Vicente and Lopez (2010) point out that people with disabilities are less likely to feel confident in their online abilities than those without disabilities.

Digital Skills Success

Overcoming the disability digital divide remains a challenge for educators. Despite the barriers, young adults with disabilities transitioning from school to college, the workplace, or other adult services can, and do, have success interacting with information and individuals online. As shown by research on the subject, students with disabilities recognize the value and experience benefits learning online. Yet there are challenges. Williams and Hanson-Baldauf (2010) investigated the usability of a web portal with support information for individuals transitioning to independent activities. Key among their findings is that people with mild learning difficulties can successfully navigate online learning environments. The ability of individuals with disabilities to adapt to digital tools may be due, in part, to the existing use of technology tools to assist in their personal life (Hall, 2013). Seok and DaCosta (2016) support this argument finding that "digital technology implementation in daily life can enhance the digital literacy of students" (p. 7).

When it comes to academic achievement, many studies show little difference in the impact of learning online between students with disabilities and those without (Allday, 2011; Dobransky & Hargittai, 2016; Jelfs & Richardson, 2010; Park & Nam, 2014; Stewart, Mallery, & Choi, 2010). There can be differences depending on the individual and the individual's disability, however, Stewart, Choi, and Mallory (2010) suggested students with disabilities were likely to achieve higher grades in online courses versus traditional classrooms. Stewart et al (2010).. point to the benefits of multimedia course content in flexible environments where students can adapt content into formats they absorb better, and instructors can share content in ways that meet a larger variety of learner needs. Where MacArthur (2009) determined that using word processing tools had positive effects on students struggling with writing skills, a study by Straub (2012) identified a positive impact on writing skills for students with learning disabilities who received writing instruction and tutoring online. Straub (2012) noted benefits of communication

in written form and media-rich instruction. One significant benefit Allday (2011) recognized is the flexibility that online learning provides for students with disabilities. In a study of courses in a virtual school, students with special needs benefited from taking breaks, repeating multimedia content as needed, and engaging in activities as often as necessary. In the virtual environment, those students with special needs seemed to do just as well academically than those without disabilities (Allday, 2011). Students with disabilities have also been successful at learning and maintaining functional skills. While limited studies examined just how adolescents and young adults with disabilities practice digital literacy in the classroom, the results from these studies are mostly positive. An encouraging study by Cihak, Wright, Smith, McMahon, and Kraiss (2015) examined whether high school students with intellectual disabilities could acquire and maintain functional digital literacy skills. They focused on three students in a high school special education classroom. Each using identical computers, the students completed a variety of tasks including emailing, using job-search websites, bookmarking those sites, and storing and retrieving documents in cloud storage. The researchers then examined how the students did on those tasks. The researchers found that the students could acquire the skills with instruction and maintain the skills over time. Another study by Park and Burford (2013) examined tablet use and whether using tablets could improve digital media literacy of young adults. The researchers discovered that tablets could improve digital media literacy, but how individuals used a device had a greater impact than the specific device they used. For example, using tablets to search for and use information as well as for social purposes increased the students' abilities to use the technology as well as comprehend the messages retrieved with it. Simply put, students using tablets for information or social purposes became better at using those specific skills (Park & Burford, 2013, p. 276).

Besides being able to apply functional skills successfully, students with disabilities also possess digital agility--the familiarity, flexibility, and confidence in using digital tools. They also possess skills in making decisions regarding the use of technology. A study by Seale, Draffan, and Wald (2010) addressed digital inclusion in higher education regarding digital agility. The study suggested the strengths of disabled students and suggested educators focus on empowering students' use of technology by, "recognizing and utilizing the digital agility of disabled students as well as their strategic fluency in negotiating complex decisions" (Seale et al., 2010, p. 459). They concluded that "disabled students can be as digitally agile as non-disabled students" (Seale et al., 2010, p. 459). In a study comparing digital literacy skills of people with and without disabilities in South Korea, Park and Nam (2014) stated that "people with disabilities are just as capable as anyone else to become digitally literate when technical barriers are overcome" (p. 410).

The digital literacy skills that people learn and practice throughout their education carry through to the workplace and life skills. For example, research suggests that student with disabilities value online communication. In one study of college students at the United Kingdom's Open University, Hall, Nix, and Baker (2013) found that "disabled students are more likely than those without a declared disability to believe that digital skills are important" (p. 216). They investigated the perception of student's digital skills development and relevance along with their motivation. While they expected to find little difference between the views of disabled and non-disabled students, their results indicated students with disabilities perceived a greater importance of digital skills, including information literacy and information communication technology skills, versus their non-disabled counterparts. The researchers concluded a potential reason for the difference includes, "that these students already see technology as something that can help with problems resulting from their disability" and that "digital literacy skills may be valued as a means to facilitate person social interactions" (Hall et al., 2013, p. 224).

What's Working?

Success in learning with digital tools for students with disabilities may be attributed to some individuals already using assistive technologies to accommodate for their disabilities. Additionally, people with disabilities value digital skills (Hall et al., 2013; Jelfs & Richardson, 2010) and can learn technology faster than those without disabilities when provided with a supportive learning environment. For example, a study by Badge, Dawson, Cann, and Scott (2008) showed students found and used controls within a learning system more quickly than those without disabilities. The researchers observed the students may have been "used to customising their own learning experiences and personalising their computing environment" and were "more self-aware than the control group" who had little interaction with the learning (Badge et al., 2008, p. 111). The learning environment the institution creates, however, impacts success.

The interaction between students and teacher and the collective efficacy and collaborations are key factors when students are learning whether in a traditional face-to-face classroom environment or an online environment (Donohoo, Hattie & Eells, 2018). Wang (2014) addressed the issue of trust in her research, which includes having confidence not only in the e-learning system but also in the instructor and institution. Wang (2014) writes that "by implementing strategies and features that enhance the trustworthiness of online learning environments, online instructors can be more effective ... helping students with disabilities succeed in online learning" (p. 356). Social interaction between instructors and learners also increases learning goals as discovered by Alamri and Tyler-Wood (2016) who share, "[t]he extent to which the students will participate in online courses depends on the way instructor will facilitate and provide appropriate directions to their students" (p. 67). All these findings underscore the importance of equity in access to education.

The impact of the learning environment and the identified importance of the factors that make up this environment (e.g., age, gender and geographic location) necessitate the need to innovate improved student outcomes (Hattie, 1992; Houghton, Hattie, Wood, Carroll, Martin & Tan, 2014). New approaches may assist by removing the visibility of disabilities. While online learning can break down geographic barriers such as access as Straub (2012) points out, it may also diminish stigma experienced by those with disabilities. Barnard-Brak and Sulak (2010) studied attitudes about requesting accommodations by college students. They found that "individuals with visible disabilities may simply prefer online courses given that their fellow classmates would possibly never know that they have a disability unless they chose to disclose this information online" (Barnard-Brak & Sulak, 2010, p. 87).

Gaining confidence in the use of technology tools and online communications also helps people with disabilities succeed in social engagement. Good and Fang (2015) recognize the social connections young people make using the internet. Yet those with learning disabilities (LDs), autism spectrum disorders (ASD) and attention deficit hyperactivity disorder (ADHD) may need additional support as they transition to becoming independent adults to interact with others online safely and effectively. That support can result in improved social interactions. Good and Fang (2015) argue that young people with LDs or ASD actually benefit from online interactions where they can rely on text for communication without confusing social cues. Once in the workplace, this becomes advantageous as technology becomes a crucial component of business communications.

In the work environment, government regulations support workers with disabilities. The Americans with Disabilities Act (ADA) "makes it unlawful to discriminate in employment against a qualified individual with a disability" (Harkin, 1990, p. 7). It also defines reasonable accommodations, which include "making existing facilities used by employees readily accessible to and usable by individuals with disabilities" and

the restructuring of a job, modifying the tools to do the job, or providing resources to support completion of work (Harkin, 1990). Beyond regulation compliance, there are additional advantages to hiring people with disabilities. The Institute for Corporate Productivity (Institute for Corporate Productivity (i4cp), 2014) found that people with intellectual and developmental disabilities (IDD) performed just as well as people without disabilities on a number of performance factors. More, employers report cost savings and productivity improvements when accommodations are put in place for workers with disabilities. Those include increased employee attendance and decreased costs for retention and training of staff along with increased overall company productivity (Hartnett, Stuart, Thurman, Loy, & Batiste, 2011; Loy, 2017).

Solutions: How Can We Bridge the Disability Digital Divide?

Based on the body of research on this topic, the question begs, what can educators, instructional designers, policymakers, college and university administrators, and employers do to help bridge the disability digital divide? In the next section, some of the more promising opportunities to make it easier for people to acquire digital literacy skills are presented.

DIGITAL TECHNOLOGY USE IN THE CLASSROOM

Using digital technology in the classroom provides many benefits for all students, including those with disabilities. In grades K-12, research suggests that digital technology can improve knowledge acquisition, engagement, student achievement, and self-improvement (Alsalem, 2016). One device studied extensively is the use of the tablet as an instructional tool. Tablets in the classroom have shown improved reading outcomes for students with intellectual disabilities (Coleman, Hurley, & Cihak, 2012) and reading comprehension and vocabulary of students with attention deficit disorders (ADHD) (Retter, Anderson, & Kieran, 2013) and autism (Ganz, Boles, Goodwyn, & Flores, 2013; Whitcomb, Bass, & Luiselli, 2011). What is appealing is how easily this technology suits individuals' learning needs with modifications, which helps to provide the learner more control over their learning experience (Coyne, Pisha, Dalton, Zeph, & Smith, 2010). Additionally, through digital technology, learners have shown more motivation due to the personalization of the instruction over traditional classroom activities because students are allowed more freedom to explore independently (Hodis, Hattie & Hodis, 2017).

COMPLY WITH ACCESSIBILITY LAWS AND STANDARDS

Laws in the United States, like the Rehabilitation Act of 1973, established the parameters for access to education. For instance, "until the mid-1970s, laws in most states allowed school districts to refuse to enroll any student they considered "uneducable," a term generally defined by local school administrators" (Martin, Martin, & Terman, 1996, p. 26). That said, the Rehabilitation Act impacts more than education. Amended in 1998, it includes Section 508, the often-cited rule for accessibility. The amended Section 508 requires federal agencies to have accessible technology tools for people with disabilities (U. S. General Services Administration Federal Government, 2003). Federal agencies must now provide the same access to information for those with and without disabilities. To address advances in technology, the Architectural and Transportation Barriers Compliance Board, or Access Board, has updated the

rules defining Section 508 yet again. Compliance will be mandatory as of January 2018 (Information and Communication Technology (ICT) Standards and Guidelines Final Rule, 2017). This latest update shifts the focus of guidelines to the function of technology versus product-specific given the rate of change of technology and adaptation of tools for a variety of purposes. The changes also expand coverage to include electronic documents and content (Econometrica Inc., 2017). It is too soon to tell how the update for Section 508 will impact learning digital literacy skills specifically, though one can expect that improved accessibility of online learning will have positive impacts for students with disabilities.

Section 504 of the Rehabilitation Act states that "no otherwise qualified individual with a disability in the United States ... shall, solely by reason of his or her disability, be excluded from the participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving federal financial assistance" (Brademas, 1973, p. 141). Another important element of law for individuals with disabilities is in Section 255 of the Communication Act (Telecommunications Access for People with Disabilities, 2012). This law requires telecommunication services and products to be accessible to people with disabilities. This Communications Act was strengthened by the Twenty-First Century Communications and Video Accessibility Act of 2010, which updated a number of existing laws with current technologies (21st Century Communications and Video Accessibility Act (CVAA), 2011) including the Americans With Disabilities Act (ADA). The ADA provides enforceable standards to address discrimination of people with disabilities (Harkin, 1990).

While the regulations create the opportunity for people with disabilities to access education--and ultimately employment--the reality is that not all of the rules and regulations are meeting the needs of those with disabilities. In a study of 219 distance education program websites, only 15% were free of accessibility issues (Schmetzke, 2001). Since then, website accessibility compliance has risen to 23% globally, however, that percentage is still woefully low by most standards (Erickson, Lee, & von Scrader, 2017; Siteimprove, 2016). Most errors preventing accessibility were a lack of image descriptors or tags readable by assistive technology for people with visual disabilities. A case study of the University of Washington Distance Learning Program outlined the efforts for creating accessible online courses (Burgstahler, Corrigan, & McCarter, 2004). Vagueness in the application of how Section 508 standards are performed present challenges along with ways of overcoming technical problems such as displaying some characters on a screen and addressing file formats. The researchers concluded there was a critical need to define and apply universal design principles in the development of online courses (Burgstahler et al., 2004).

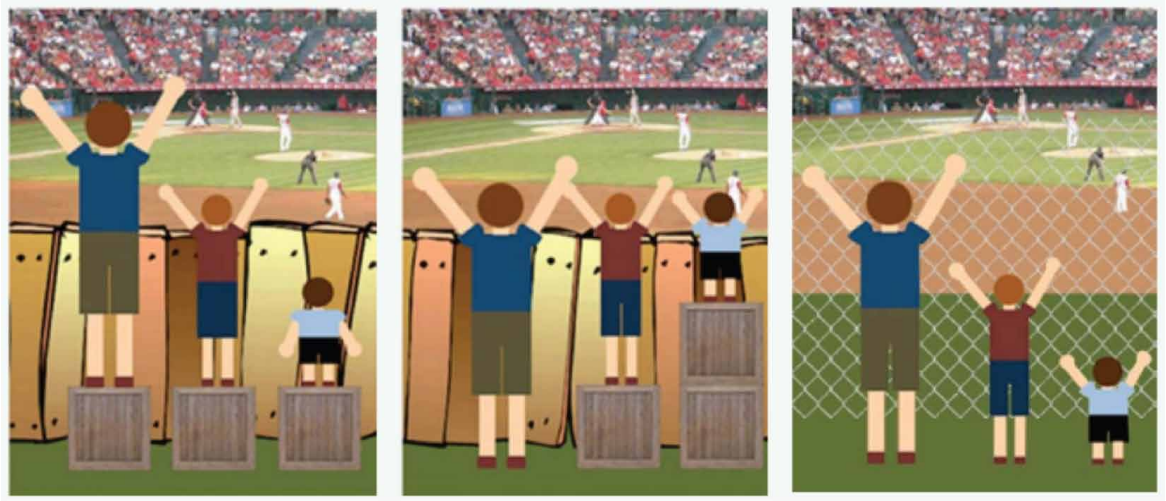
Conjoined with the need for a set of established standards for designing instruction is an issue of self-identification. In a study of students' satisfaction with institutions' accessibility and compliance services, the authors found many students did not disclose their disability (Roberts, Crittenden, & Crittenden, 2011). They suggest that, in some cases, students taking online courses may not know what accommodations are available or what to request. The authors recommend providing online resources with information about services and accommodation options and developing online courses with the institution's disability services. They conclude that "institutions who offer online courses and degree programs would benefit from providing online resources to all students as to educate them about the services offered to students with disabilities" (Roberts et al., 2011, p. 247). A coordinated approach to design and delivery of online instruction may also alleviate unresolved support and accommodation issues discussed in some research (Fichten et al., 2009; Roberts et al., 2011). Ability is not a factor when access to tools, training, and accommodations are met. Dobransky and Hargittai (2016) found "no difference by disability status" in the use of information-seeking, employment, or education behaviors when taking

into account "basic access, demographics, socioeconomic status, autonomy of use, time spent online, and Web-use skills" (p. 26). Accessibility laws and standards have yet to scratch the surface of bridging the gap in digital skills for learners with disabilities, however, they are a foundation for inspiring awareness and ultimately solutions to the issues.

TAKE A UNIVERSAL DESIGN APPROACH

Where accessibility legislation for education and workforce training might fall short, Universal Design for Learning (UDL) instructional framework could help accommodate individuals with special learning needs. Often referred to simply as UDL, it is an approach that attempts to address the needs of all learners to create including removing and lowering barriers to self-actualization (Mace, Hardie, & Place, 1991). Moreover, as shown in Figure 1, UDL represents a growing set of design principles aimed at supporting learners while interacting within a digital learning and non-digital environments (Edyburn, 2010; Hoddis, Hattie & Hodis, 2017; Iwarsson & Ståhl, 2003; Spooner, Baker, Harris, Ahlgrim-Delzell, & Browder, 2007). The abilities or disabilities of the student do not need adjustment, but rather, the design of the curriculum and learning environment. In a case study conducted by Meo (2008), a classroom instructor noted that he typically blamed students for failing his classes thinking they were not prepared or had

Figure 1. Comparison of UDL to other types of instruction. Image reprinted with permission from "Advancing Equity and Inclusion: A Guide for Municipalities," by City for All Women Initiative (CAWI), 2015, Retrieved from http://www.cawi-ivtf.org/sites/default/files/publications/advancing-equity-inclusion-web_0.pdf Copyright 2015 by CAWI. Captions adapted with permission from "Implementing Universal Design for Learning on Canvas," by Moore, 2017, Canvas Community Blog, Retrieved from https://community.canvaslms.com/groups/designers/blog/2017/10/16/implementing-universal-design-for-learning-on-canvas Copyright 2017 by Canvas.



some personal limitations. After following UDL guidelines to develop instruction, the same instructor realized it was the curriculum that was creating barriers, and it needed to be adjusted to increase options for learning for his students (Meo, 2008). Similarly, a study by Hall, Meyer, and Rose (2012) pointed out that UDL enables educators to "recognize that variance across individuals in the norm" and that curriculum should be "adaptable to individual differences rather than the other way around" (p. 4). Researchers welcome this concept suggesting educational institutions "place too much emphasis on the disabilities in students, not enough on the disabilities in the learning environment" (Rose, Harbour, Johnston, Daley, & Abarbanell, 2006, p. 150). By applying universal design to structures, designers of a building may consider the needs of individuals with physical disabilities. Designing an accessible entryway for individuals in wheelchairs does not diminish access for individuals with full mobility. It improves access for individuals for a variety of reasons including illness, age, or the burden of carrying a heavy box.

Nevertheless, the potential of UDL is not yet fully realized. UDL is not just limited to curriculum or physical disabilities--it can help reduce all types of barriers for students while holding all students to similar achievement expectations. Development of UDL has largely been a concerted research effort led by the Center for Applied Special Technology (CAST) (About Universal Design for Learning, 1984), Mace (2008), and the National Center on Universal Design for Learning (The three Principles of UDL, 2014). The now widely adopted principles, boil down to the three overarching principles of (1) provide multiple means of representation, (2) provide multiple means of action and expression, and (3) provide multiple means of engagement (Rose & Meyer, 2002; Rose & Meyer, 2006).

The relationship between learning and technology is reciprocal; as stated, learning to use technology is critical in this digital age, and using technology is equally important. Technology allows the delivery of personalized learning (Hall et al., 2012). Meyer and Rose (2000) pinpoint the flexibility of computers and the internet to assist teachers to create customized instruction through the use of multimedia and assistive technology. UDL utilizing technology allows for delivery of "flexible instructional practices directly within the core instructional curriculum" for access by students (Hall et al., 2012, p. 7). The flexibility that UDL creates benefits everyone in the learning experience, including teachers. One study related to UDL learned that implementing UDL can save teachers time by creating lessons that involve all students up front, versus adjusting them after the fact to make accommodations (Spooner et al., 2007). Rose and Meyer (2006) also explain that an advantage of designing universally is building a lesson once, but using it many times. A later study by Burgstahler (2001, p. 2) noted that "planning for access as the course is being developed is much easier than creating accommodation strategies once a person with a disability enrolls in the course."

It is imperative to note that teachers carry some of the heaviest burdens in adapting course content to meet the needs of students with disabilities (Meo, 2008). Lessening the load are readily-available resources such as curriculum development tips and lesson plan designing with UDL to help (Spooner et al., 2007). As Pisha and Coyne (2001) stated about the flexibility that UDL provides for teachers, the "range of new options, when thoughtfully applied, can be expected to facilitate learning, reduce frustration, and promote increased engagement in the learning process" (p. 200).

For all its advantages, it is important to remember that UDL is not a panacea. Hitchcock and Stahl (2003) prognosticate that, "it is not a replacement for effective classroom practices" (p. 49). In implementing a UDL approach to learning, Hall et al (2012) cautiously state that UDL is not a magic solution that fits for everyone. Rather, it means that all learners with all their individual difference have equal and fair access and opportunity to learn the same content in ways that work best for them.

Making UDL Mainstream

While adapting the learning experience to fit the individual can improve learning outcomes, it is only a solution if those in roles who create instruction can apply the approach. The literature suggests that students with disabilities can successfully learn digital skills, but incorporating digital literacy in the classroom is a challenge for both general and special education teachers (Alsalem, 2016; Voogt, Erstad, Dede, & Mishra, 2013). Preparing lessons that apply digital literacy in meaningful ways like (Ertmer & Ottenbreit-Leftwich, 2013) suggest, can be time-consuming. For example, one study surveyed 682 teachers, general and special education teachers, about their experiences teaching digital literacy. The top challenge among teachers was the time it took to prepare content for digital consumption (Alsalem, 2016). Combining inadequate access to technology tools and restrictive computing policies exacerbates time constraints (Alenezi, 2017). Also, educators may not be adequately prepared to meet the demands of the modern classroom (Alenezi, 2017; Borthwick & Hansen, 2017).

Borthwick and Hansen (2017) suggest professional development programs may fill the gap. Alenezi (2017) identified that teachers' comfort level with technology impacted their use of it in the classroom, however, fear of losing instructional time with students prevented teachers from participating in professional development programs offered by their institutions.

Still, professional development programs do not always provide adequate support after training ends and teachers return to their classrooms. Even when professional development programs are effective at training individuals how to use and teach digital literacy skills, without continuous support from leadership, teachers may not continue using what they learned (Kafyulilo, Fisser, & Voogt, 2016). Teachers, including those considered "digital natives" (Prensky, 2001; Southall, 2012), need continuous guidance and feedback. For example, teachers reluctant to try out new technology in the classroom may rely on older, and less effective, methods of teaching (Collier, 2012).

LEVERAGING INSTRUCTIONAL MODELS

Why Leverage HPI Models?

Addressing these issues is not easy. One way to approach the challenge of introducing digital literacy skills to young adults is by using human performance improvement (HPI) tools (Rothwell, 1999). HPI applies methodologies and strategies drawn from behavioral psychology, instructional technology, and organizational development, among others, to help people improve their performance in the classroom, job, and elsewhere. There are several reasons we think using HPI tools for digital literacy improvement projects is worth considering. The first reason is they provide guidance for working through complex problems that involve human behavior. Changing human behavior is a difficult endeavor. Many HPI tools were designed using theoretical and empirical evidence and then tested in practice so they can be used to reliably change how people learn and behave. Another reason is the tools provide guidance for different elements of a project. There are a lot of different tasks and processes that practitioners need to do during the course of a project. HPI tools help to provide an organized framework for completing each of these tasks and processes, which could help minimize the taxation on educator's time developing instructional materials. Finally, they help to keep the focus on results. The tools are designed so

that the end results are always at the forefront, which is important because it makes it easier to stay on target and within budget.

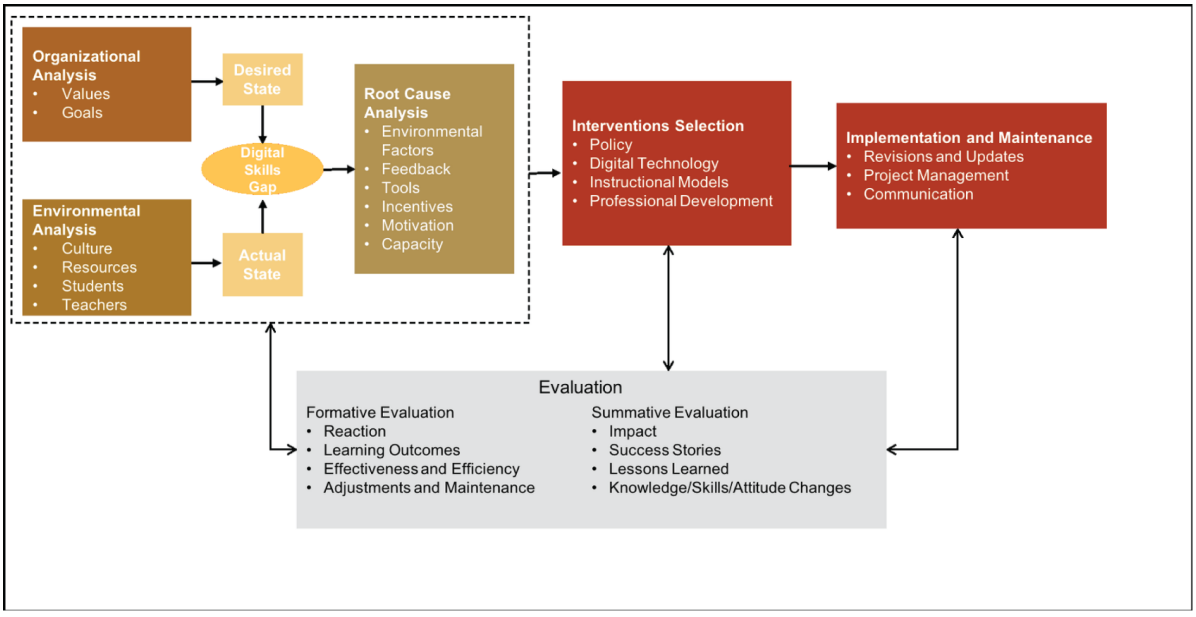
The HPI Process

Following the foundations of the HPI model, as shown in Figure 2, the process begins with gathering information to identify the performance problem, why it exists, and determine the gap impacts (Swanson, 2007). This informational gathering stage helps decision makers learn more about the target learning group and analyze environmental factors that might help or impede success. After defining the goals, stakeholders discuss solutions and decide how to help people meet those goals. Next, solutions are developed and tested. In the final stages of the HPI process, the solutions are evaluated against a set of criteria to determine if it is working or if adjustments are needed (Swanson, 2007).

Designing Learning Experiences

When a learning solution is necessary, HPI practitioners design and develop learning solutions that meet the needs of the target group. Typically, instruction design supports the goals of the learner. Using reliable models makes it easy to replicate and adapt content and design elements as necessary. Practitioners of HPI will choose a model based on their experience using the model, personal preference, desired outputs, and context for the application. By applying trusted HPI models for instruction, the practitioner creates learning environments that are not only engaging but also help the learners acquire skills to accomplish their goals (Swanson, 2007).

Figure 2. Human Performance Improvement Model for designing instruction. Adapted with permission from "Fundamentals of Performance Improvement: Optimizing Results Through People, Processes, and Organizations," Van Tiem, Moseley & Dessigner (2012).



Digital Literacy Training Program

As a potential exemplary solution that follows federal standards and was designed following the UDL framework using HPI tools; a research team has recently designed and developed a digital literacy skills training for young adults with disabilities preparing for college and the workplace preparation. The College and Career Prep Digital Literacy Training Program is a flexible, blended learning solution for individuals with learning disabilities. To more adeptly meet the needs of this target audience, training is in the form of either an online self-study course or as an in-person facilitated learning experience (which could be one-on-one sessions or in a classroom setting with multiple participants). Sponsored by the State of Idaho Board of Education Vocational Rehabilitation department, the training program uses instructional software, Articulate Storyline 2, and hosted online in a way that would maximize participation with a lightweight, flexible learning management system.

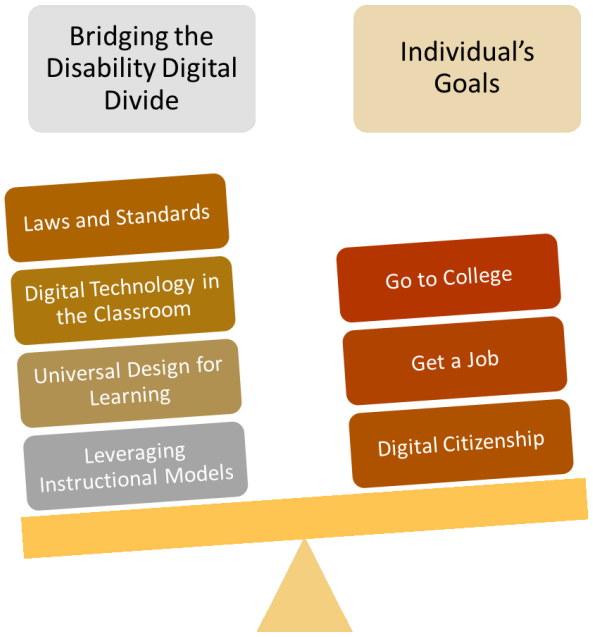
To help meet the needs of a group with diverse learning needs, the training modules work in any order. The training is adaptable to the learners, so they can complete the workshop online at their convenience or take as much time as they need to complete the workshop. In rural locations like Idaho, the training can reach a larger audience with this adaptability. Albeit a byproduct, learners are introduced to learning online, which is an important lifelong learning skill and digital literacy in and of itself. The modules are designed for reuse in various capacities (e.g., by a high school teacher for his or her class, as a part of a one-time instructional offering like a workshop, or even as a tool for parents to work one-on-one with their children). The program has two main tracks -- Track 1: Entering the Job Market and Track 2: Bound for College. Depending on the learner's goals, they may complete it in full or in part, as best suits their needs. The release and implementation of this innovative program are currently underway. Yet, the initial response by educators, parents, and other service providers is overwhelmingly positive. There is research forthcoming about how young adults with disabilities respond to the digital literacy content, instructional design, and learning delivery methods.

CONCLUSION

In sum, it is possible, with the right supports, for young learners with disabilities to achieve their life goals. Just like everyone else, they want to pursue their goals, dreams, and hopes in efforts to be global citizens. It is evident digital literacy skills are essential to be able to do so. These skills are necessary to participate in higher education, to apply for jobs, and to complete job tasks. People with disabilities, however, have disadvantages when it comes to learning these skills. While the barriers do exist, though, individuals with disabilities want to learn and can learn digital literacy skills when the learning environment supports their needs. The research cited in this article shows that educators, instructional designers, administrators, employers, and policymakers can help people with disabilities acquire the digital skills they need to be successful in the classroom and in the workplace. As depicted in Figure 3, the building blocks to bridge the digital divide for learners with disabilities includes:

- **Create Flexible and Adaptable Learning Environments:** Learning interventions can be flexible and adaptable to address individual needs versus a one-size-fits-all solution by utilizing the technology tools now available;

Figure 3. Building Blocks to Support Students with Disabilities Bridge the Digital Divide



- **Apply Accessibility Laws and Standards:** Accessibility laws and standards help improve online learning environments when their guidelines are followed. Improving compliance creates improved education experiences while benefiting both the workforce and employers;
- **Provide Support for Teachers:** To be effective when teaching digital literacy skills, or any skill for that matter, teachers need the training, tools, and support from leadership to implement digital literacy in the classroom.

We have over one million young people with disabilities in our education system today. As such, it is imperative they are prepared for the transition to college, the workplace, and adulthood in our technology-rich world. They have a future filled with digital tools not yet defined; their success is built upon the digital literacy skills they are supplied with now.

ACKNOWLEDGMENT

This research was supported and fully funded by the Idaho Division of Vocational Rehabilitation. In particular, we especially thank Mrs. Alison Lowenthal who provided vision, insight and expertise that greatly assisted the research. We also thank the Michaels & Associates team for their assistance with developing the Digital Literacies Training program, and the administrators from the Boise State University's Office of Sponsored Projects, College of Engineering, and Department of Organizational Performance and Workplace Learning for their work behind the scenes.

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This research was previously published in the International Journal of Digital Literacy and Digital Competence (IJDLDC) edited by Antonio Cartelli, pages 1-20, copyright year 2018 by IGI Publishing (an imprint of IGI Global).