# Chapter 29
# Digital Literacy in Special Education:
## Preparing Students for College and the Workplace

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## ABSTRACT

*Digital literacy is essential for individuals entering college and the workplace. Students with disabilities experience a greater challenge in acquiring the skills necessary to succeed. This chapter explores the disability digital divide, success factors for acquiring digital skills, and the implications of a digital literacy curriculum developed for special education classrooms in Idaho. It demonstrates how leveraging human performance improvement (HPI) models, incorporating universal design for learning (UDL) principles, and supporting classroom teachers resulted in a curriculum to help young people with disabilities to acquire the digital skills they need to be prepared for college and the workplace.*

DOI: 10.4018/978-1-6684-3670-7.ch029

## INTRODUCTION

Digital literacy is essentially the acquisition of the skills and abilities needed to read, write, and communicate in the 21st century using current and emerging technologies (Buckingham, 2015; Gilster, 1997; Museum and Library Services Act of 2010, 2010; Spencer, 1986; U.S. Department of Labor, 2016). While scholars have studied *digital literacy* and developed multiple models for how best to acquire these skills for decades, Margaret Spencer (1986) and then Paul Gilster (1997) were the first to define the concept of digital literacy (Buckingham, 2015). Subsequent researchers have expanded upon that early work of defining what it means to be digital literate (Knobel & Lankshear, 2006; Koltay, 2011; Merchant, 2007; Russo, Watkins, & Groundwater-Smith, 2009). Some of these researchers focused mostly on the technical skills needed to be digitally literate because computer use at the time was primarily focused on basic "operational skills" (e.g., mathematical calculations and word processing). Now that computers are ubiquitous, more recent definitions often focus on higher-level cognitive processes such as communication skills and critical thinking skills (Battelle for Kids, 2007; Belshaw, 2012; Educational Testing Service, 2002; Janssen et al., 2013; Neumann, Finger, & Neumann, 2017). 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). However, 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, conceptualized 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 argued 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.

These various definitions illustrate that digital literacy is not a singular entity, but instead a combination of intertwined skill sets, competencies, and attitudes (Bawden, 2008). The literature makes clear 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). For this chapter, we conceptualize digital literacy as a necessary but evolving skillset needed for communicating and interacting in the 21st century. Here, we will illustrate how important digital literacy skills are in college and the workplace and why special educators in particular need to focus more on helping special education students acquire these needed skills.

### The Role of Digital Literacy in College and Career Readiness

Digital literacy skills are vital to student success in college and the workplace. In fact, in the United States, the Workforce Innovation and Opportunity Act (WIOA) recently highlighted the importance of digital literacy skills in the workplace (U.S. Department of Labor, 2016); WIOA emphasizes that the

skills used to read, understand, and navigate information online has become essential in the workplace. Similarly, a recent report conducted by the World Economic Forum (World Economic Forum, 2016) explains how technological advances will continue to impact all types of work. In fact, Schwab (2017) argues that we are now entering a new age of work, which he coined "the 4th Industrial Revolution." This shift in the workplace Schwab (2017) explains is characterized by "a fusion of technologies that is blurring the lines between the physical, digital, and biological spheres" (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.

Students face a similar challenge going to college. The initial college application, to applying for financial aid, to registering for courses, all require a certain set of digital literacy skills. Leiberman (2019) even boldly stated that "[n]o student will pass through higher education without seeing or using digital technology" (para. 1). In one study of 397 adult learners aimed at addressing barriers to transition to college and careers, Goodman and Kallenbach (2018) concluded that most participants would benefit from programs with explicit digital literacy instruction in order to complete tasks including navigating the college admissions process and financial aid systems. There are those who do not make a distinction between the digital skills needed for the workplace and those needed for college as shared by Duffy (2018) in a study of an elementary school's instructional technology initiative for college and career readiness. The initiative evaluated in that study noted a need to focus on among other things, communication, keyboarding, and technology skills, even in the elementary grades.

## Acquiring Digital Skills

The literature leaves no doubt as to the importance of digital literacy skills for individuals to thrive in education and the workplace. However, questions remain on how individuals should acquire those skills (Voogt, Erstad, Dede, & Mishra, 2013). It is not just a result of classroom learning, though classroom learning does play a strong role. Although it is common for young children to experience technology before even walking, most kids begin to learn digital literacy skills in grade school. Children first begin learning how to use technology informally by observing those around them (Plowman, McPake, & Stephen, 2008; Plowman, Stevenson, McPake, Stephen, & Adey, 2011). 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). At the same time, parents influence children's attitudes and interest in technology (Lankshear & Knobel, 2011). Still, 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 by Kaminski, Switzer, and Gloeckner (2009) found that students' self-reported proficiency with some digital skills diminished from entry to completion of their college undergraduate studies. The study measured students' perception of their fluency with technology by surveying incoming freshmen and then later 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 using digital tools based on what they were learning (Kaminski et al., 2009). This is significant because a number of digital literacy definitions and frameworks emphasize the importance for students to develop 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.

## The Disability Digital Divide

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 a vision impairment, unable to hear the audio in video explanations because of a 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 due to the low income and limited education and career opportunities that can result from having a disability (Kim & Doh, 2006). Research by Vicente and Lopez (2010) supports this finding, showing that people with disabilities are less likely to use the Internet due to the added costs for adaptive technology tools. Further, an individual is less prepared to use digital tools that are not easily accessible. Kim and Doh (2006) add, however, that socioeconomic factors are only part of the cause. Confidence is also a factor. Vicente and Lopez (2010) point out that people with disabilities are less likely to feel confident in their online abilities than those without disabilities. Overcoming the disability digital divide remains a challenge for educators. Despite the barriers, though, 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. Williams and Hanson-Baldauf (2010) investigated the usability of a web portal with support information for individuals with exceptionalities transitioning to independent activities. Key among their findings is that those 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 they use in their personal life (M. Hall, Nix, & Baker, 2013). Seok and DaCosta (2017) concur that the regular use of digital technology can improve students' digital literacy skills. Young people with disabilities have been successful at learning and maintaining these functional skills with daily practice.

## Digital Skills Success

While there is limited research focused on how adolescents and young adults with disabilities develop digital literacy skills 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 performed on those tasks. The researchers found that the students could acquire the skills with direct instruction and then maintain their skills over time. Another study by Park and Buford (2013) examined tablet use and whether using tablets could improve digital media literacy of young adults. The researchers

found 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, individuals who simply played with the device did not experience the increased skills that those who used the devices for information retrieval and for socializing experienced (Park & Burford, 2013, p. 276).

Research also suggests that besides being able to apply functional skills successfully (such as operating a device, searching the web, or interacting with software), students with disabilities also possess digital agility--the familiarity, flexibility, and confidence in using digital tools to make decisions regarding the use of technology. A study by Seale, Draffan, and Wald (2010) addressed digital inclusion in higher education regarding digital agility. Seale et al. (2010) recommended 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" (p. 459). They concluded that with the right supports, students with disabilities can be just as digitally literate as students without disabilities (Seale et al., 2010). In another study, Park and Nam (2014) compared the digital literacy skills of people with and without disabilities in South Korea; they concluded 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, online communication, which is commonplace in today's environment, is valued by students with disabilities. In a 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 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" (M. Hall et al., 2013, p. 224).

While researchers affirm that people with disabilities place value in digital skills (M. Hall et al., 2013; Jelfs & Richardson, 2010), it also holds that they may 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 tools previously (Badge et al., 2008, p. 111). The learning environment the institution creates, however, impacts success.

Teacher and student interaction, as well as the collective efficacy and collaborations between the teacher and student are one of the key factors for student learning whether in a traditional face-to-face classroom environment or via an online environment (Donohoo, Hattie, & Eells, 2018). Trust, in particular, is extremely important. 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 the teacher-to-student relationship.

While high interaction to build trust is important, it does not necessarily imply a need for physical proximity. New approaches in education may assist by removing the visibility of disabilities. While learning can break down geographic barriers like access, as Straub (2012) points out, it may also diminish the stigma experienced by those with disabilities. Barnard-Brak and Sulak (2010) studied attitudes about requesting accommodations by college students. They stated that "individuals with visible disabilities may simply prefer online courses given that their classmates would possibly never know that they have a disability unless they chose to disclose this information online" (p. 87).

The confidence built by the use of technology tools and online communication isn't limited to education. It 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 to interact with others online safely and effectively as they transition to becoming independent adults. 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.

Research supports the need for students with disabilities to develop digital literacy skills to help them later succeed in entering and functioning in higher education and the workplace. The question remains, what can we do to help bridge the disability digital divide? Some research suggests that the answer might be by starting with the teachers and students in the classroom.

Using digital technology in the classroom provides many benefits for all students, including those with disabilities. In grades K-12, evidence 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 been shown to improve reading outcomes for students with intellectual disabilities (Coleman, Hurley, & Cihak, 2012) and reading comprehension and vocabulary of students with attention deficit disorder (ADD) (Retter, Anderson, & Kieran, 2013) and autism (Jennifer B. Ganz, Margot B. Boles, Fara D. Goodwyn, & Margaret M. Flores, 2013; Whitcomb, Bass, & Luiselli, 2011). Coyne, Pisha, Dalton, Zelph, and Smith (2010) argue that tablets are appealing to researchers and educators alike because of how easily this technology suits individuals' learning needs with modifications, which helps to provide the learner more control over their learning experience. Researchers have also found learners have shown more motivation using digital technology, like tablets, due to the personalization of the instruction over traditional classroom activities; among other things, it enables students to have more freedom to explore content independently (Hodis, Hattie, & Hodis, 2017).

## Developing a Digital Literacy Curriculum for the Classrooms of Idaho

Due to the need to help students with disabilities develop digital literacy skills in the classroom that will later help them continue on to post-secondary education and/or land gainful employment, the Idaho Department of Vocational Rehabilitation (IDVR) partnered with Boise State University to develop some digital literacy curriculum. The curriculum--which the Boise State researchers often refer to as the Col-

lege and Career Prep Digital Literacy Training Program because it can be used by classroom teachers, individual students, or even IDVR counselors with customers--is a flexible, blended learning solution for individuals with learning disabilities. The curriculum consists of two tracks: one track is focused on the digital literacy skills needed to get a job and the other is focused on the digital literacy skills needed to go to college. Table 1 lists the names of each module in each track. To more adeptly meet the needs and diversity of this target audience, the curriculum was developed to be delivered in a classroom (facilitated by a teacher) or completed in a self-study format at any time or place. Each module consists of the following:

- An online video, taking a scenario-based approach, introducing the module (built-in Articulate Storyline)
- An interactive online video pretest (built-in Articulate Storyline)
- The module content (either in a PowerPoint/handout or Self-Study Guide format)
- An interactive online video posttest (built-in Articulate Storyline)

*Table 1. Digital Literacy Curriculum*

| | **Track 1: Entering the Workplace** | **Track 2: Going to College** |
|---|---|---|
| **Module 1** | Introduction to Communicating Online | Introduction to Communicating Online |
| **Module 2** | Building Your Employment Profile | Choosing a School |
| **Module 3** | Finding Your Next Employment Opportunity | Applying for College and Housing |
| **Module 4** | Applying for Jobs Online | Applying for Financial Aid |
| **Module 5** | Following Up | Following Up |

Developing a curriculum for such a diverse audience and varied contexts can be challenging. Given this, the research and development team took a design-based research approach when developing this curriculum; this involves iteratively developing and implementing an instructional intervention in authentic contexts to iteratively improve the intervention over time.

For instance, a couple of researchers worked with IDVR to present the first iteration of the modules at some local secondary classrooms. They focused specifically on getting feedback on the first module, Introduction to Communicating Online. They used two approaches: one approach had members of the research team lead a lesson on communicating online; the other approach had the classroom teachers (after a quick introduction to the content) lead the lesson. Overall, the researchers found that leading the lesson themselves was not truly testing the curriculum in an authentic setting because they did not know the students the way the students' classroom teachers did. They also learned a number of things about the curriculum through some of these design experiments of the curriculum, such as the curriculum was too long, the reading level was inappropriate, it was too text-based, and finally, many of the teachers themselves lacked digital literacy skills.

As a result of these lessons learned, the curriculum was updated and further introduced to other teachers. However, the researchers found that many teachers still lacked the digital literacy skills needed to use this curriculum in their classroom. Given this, as well as some IDVR policy changes, the research-

ers collaborated with IDVR, the Idaho State Department of Education, and the University of Idaho to develop a professional development online course focused on teaching teachers the digital literacy skills needed for entering the workforce or continuing on to post-secondary education. This online professional development course will be offered for the first time in the Fall of 2019. Once teachers complete the online professional development course, they will be able to download the classroom version of the curriculum to use in their own classrooms.

## Implications

Through reviewing the literature and our own experience developing digital literacy curriculum for students with disabilities and special education teachers, we learned a few things that might help other teachers, instructional designers, and/or researchers, which we will briefly address in the rest of this chapter.

## Leverage HPI Models

One way to approach the challenge of introducing digital literacy skills to young adults is by taking a human performance improvement (HPI) approach (Rothwell, 1999). HPI applies methodologies and strategies drawn from behavioral psychology, instructional technology, and organizational development, among others, to help people improve people's 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. HPI tools help to provide an organized framework for completing the many tasks and processes involved with such an undertaking. In practice, it could help minimize the taxation on educator's time developing instructional materials. Finally, HPI helps 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.

## Take a Universal Design Approach

Another way to approach this problem is by utilizing A Universal Design for Learning (UDL) instructional framework, an evidence-based approach to 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, UDL represents a growing set of design principles aimed at supporting learners while interacting within a digital learning and non-digital environments (Edyburn, 2010; Iwarsson & Ståhl, 2003; Spooner, Baker, Harris, Ahlgrim-Delzell, & Browder, 2007). The abilities or disabilities of the students 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 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). This is supported in a study by Hall, Meyer, and Rose (2012), who pointed out that UDL enables educators to "recognize that variance across individuals is 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).

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 differences have equal and fair access and opportunity to learn the same content in ways that work best for them.

### Support the Teachers

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 et al., 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 these time constraints (Alenezi, 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. The College and Career Prep Digital Literacy Training program research team took this into consideration in ultimately designing a digital literacy curriculum that supports teachers' professional development while providing the curriculum they can implement in their classrooms.

## CONCLUSION

In conclusion, it is possible, with the right support, for young learners with disabilities to achieve their life goals. Just like everyone else, they want to pursue their goals, dreams, and hopes in an effort to be global citizens. It is evident digital literacy skills are essential to be able to do so. They are necessary to participate in higher education, to apply for jobs, and to complete job tasks. People with disabilities, however, are at a disadvantage 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 digital literacy curriculum and the corresponding online professional development teacher training explained in this paper demonstrated the need for the learning environment to adapt not only for learners but for the teachers as well. The research cited in this article also shows that educators, instructional designers, and administrators can help young people with dis-

abilities acquire the digital skills they need to be successful in the classroom and in the workplace. The authors recommend building learning with a Human Performance Improvement approach, incorporating universal design for learning elements, and supporting the teachers with professional development and a ready-to-implement curriculum.

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 develop now.

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*This research was previously published in Examining the Roles of Teachers and Students in Mastering New Technologies; pages 150-163, copyright year 2020 by Information Science Reference (an imprint of IGI Global).*