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An Exploration of the Digital Technology Skills Important in the Workforce and the Digital Technology Preparation of Individuals with Intellectual Disabilities in Inclusive Postsecondary Education Programs

Erika Moore
University of Central Florida

AN EXPLORATION OF THE DIGITAL TECHNOLOGY SKILLS IMPORTANT IN THE WORKFORCE AND THE DIGITAL TECHNOLOGY PREPARARTION OF INDIVIDUALS WITH INTELLECTUAL DISABILITIES IN INCLUSIVE POSTSECONDARY EDUCATION PROGRAMS

by

ERIKA MICHELLE MOORE
B.S. University of Central Florida, 2012
M.A. University of Central Florida, 2016

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Major Professor: Rebecca A. Hines

ABSTRACT

This research study identifies the digital technology skills important for entry-level employees in the 21st-century workforce and assesses the digital technology preparation currently provided in Inclusive Postsecondary Education programs for students with intellectual disabilities. Digital technology skills were evaluated using the Digital Competence Conceptual Reference Model (2016). A survey was distributed to 100 U.S. employers to assess the digital technology skills in demand in the workforce. Inclusive Postsecondary Education programs were then evaluated to assess the digital technology skill preparation offered at 83 programs across the U.S. The results were analyzed to determine whether Inclusive Postsecondary Education programs are preparing individuals with intellectual disabilities with the digital technology skills necessary for job market competitiveness. Results indicated a misalignment in type of digital technology preparation offered at Inclusive postsecondary education programs and the digital technology skills perceived important in the workforce. The findings and implications of this study will provide a platform for further research and discussion about preparing individuals with disabilities for the 21st-century job market.

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"[I] don't know what I'd ever do without you, from the beginning till the end.

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Through the good times and the bad ones, whether I lose or if I win.

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LIST OF ABBREVIATIONS

CHIPS – Creating Helpful Incentives to Produce Semiconductors

COVID-19 – Coronavirus Disease

DigComp – Digital Competence

HEOA – Higher Education Opportunity Act

ID – Intellectual Disabilities

I/DD – Intellectual and Developmental Disabilities

IPSE – Inclusive Postsecondary Education

ISTE – International Society of Technology in Education

NCC – National Coordinating Center

NSC – National Skills Coalition

OECD – Organization for Economic Co-operation and Development

STEM – Science, Technology, Engineering, and Mathematics

TPSID – Transition and Postsecondary Programs for Students With Intellectual Disabilities

U.S. – United States

UNESCO – United Nations Educational, Scientific and Cultural Organization

UNICEF – United Nations Children's Fund

CHAPTER ONE: INTRODUCTION

The United States Bureau of Labor Statistics (2022) reports a widening disparity in the employment rate of people with verses those without disabilities. At the same time many researchers point to the wide range of jobs requiring digital tools and new emerging skills for daily operations (Bergson-Shilcock, 2020; Hecker & Loprest, 2019; Sicilia et al., 2018). Technology is fast becoming a key instrument in the workplace and, as a result, the demand for digital technology proficiency is increasing across many industries (Becker et al., 2017). Ensuring persons with disabilities are equipped with the digital skills needed for employment across professions is critical to ensure equitable access to employment.

Increased demand for digital skills presents a global challenge for all employers (Shakina et al., 2021; Shortt et al., 2020), and emerging technologies are transforming the work environment at an unprecedented pace (Bravo et al., 2021; Lewis, 2020). The globalization of the digital economy impacts every industry (Bughin et al., 2016; Limma et al., 2022; Manyika et al., 2016), and numerous employers report a global digital skill gap (Feijao et al., 2021; Jackman et al., 2021; Shortt et al., 2020). To help fill this gap, in 2022 the Biden Administration passed the Creating Helpful Incentives to Produce Semiconductors (CHIPS) and Science Act (P.L. 117-167) to provide the U.S. with the resources needed to stay competitive in the global economy. One of the main components of the act is the funding allocated to training and education in the fields of science, technology, engineering, and mathematics (STEM) to ensure students are prepared to enter the workforce with the skills and knowledge necessary to be successful in these areas. Initiatives like the CHIPS act highlight the importance of preparing individuals entering the job market with 21st-century job skills.

According to Brookings researchers (Muro et al., 2017), digital skills proficiency is a prerequisite for success in the 21st century. Specifically, approximately 50% of jobs today require technology skills (Taylor-Kale & Alden, 2018), with more than 75% estimated to include technical skills requirements by 2030. These figures are daunting, considering nearly one third of workers ages 16-64 in the U.S. do not have a proficient digital skills level (Mamedova & Pawlowski, 2018). For example, the National Skills Coalition (NSC) reported that 38% of employees with no digital literacy skills are in positions requiring moderate or complex computer skills, and 43% of employees with limited digital skills hold jobs requiring average or complex computer skills usage (Bergson-Shilcock, 2020). These reports suggest individuals in the workforce are unprepared for the skills required for success in the digital age.

Problem Statement

Digital literacy is an increasingly important skill set for gaining and maintaining employment in the 21st century and, therefore, is central to one's economic well-being and overall success (Chalkiadaki, 2018). The ability to use and understand digital technologies is becoming a critical part of many job descriptions, and the trend is expected to continue. As a result, an increasing concern exists for individuals who have historically been excluded from accessing digital technology (Fisher et al., 2021), including individuals with intellectual and developmental disabilities (I/DD) or individuals with a severe chronic disability – whether cognitive, physical, or both (Lussier-Desrochers et al., 2017). Thus, already underrepresented in the job market (Almalky, 2020; U.S. Bureau of Labor Statistics, 2021; Winsor et al., 2021), individuals with I/DD may face even more employment barriers with the increasing demand for digital technology skills (Ju et al., 2012; Raja, 2016). Additionally, according to Tyson (2015), overall, individuals with disabilities are less likely to receive sufficient preparation in digital

technology and, therefore, are disadvantaged in many areas, this inequity is especially true in the 21st century, where digital technology is integral to communication, education, and employment (Henderson & Tilley, 2018; Swinton & Williams, 2018).

For a population facing high unemployment rates due to various individual, environmental, and societal barriers (Khayatzadeh-Mahani et al., 2019), emerging learning deficits created by rapid technological advancements place individuals with I/DD at a significant economic disadvantage for obtaining employment (Bolstad et al., 2012; Chetty et al., 2017), often leading to exclusion from the digital economy (Lyons et al., 2019). The consequences of unemployed people with disabilities extend to the broader society. For example, in 2021, the U.S. government paid $2.2 billion in unemployment benefits, $1,134 billion in social security, and $2,418 billion in federal, state, and local welfare to individuals with I/DD and their families (Social Security Administration, 2022; U.S. Bureau of Labor Statistics, 2021). However, many persons with disabilities, including individuals with I/DD, report wanting a job (U.S. Bureau of Labor Statistics, 2022). Gainful employment for people with I/DD can have a significant economic influence on government spending and I/DD life outcomes.

As a solution to the low workforce participation rate of individuals with I/DD, the U.S. Department of Education's Office of Postsecondary Education has provided funding for various preparation programs for individuals with intellectual disabilities (ID), including the Higher Education Opportunity Act (HEOA), or Public Law 110-315, which was signed into law in 2008 (Higher Education Opportunity Act, 2008).

The HEOA is the first federal legislation explicitly addressing access to higher education of students with ID (Grigal et al., 2017). Part of this legislation, as outlined in Title VI Section 760 Part D, is the Transition and Postsecondary Programs for Students With Intellectual

Disabilities (TPSID). These inclusive postsecondary education (IPSE) programs allow individuals with ID to continue their education at a higher education institution. Most significantly, the law provided funding for the development of Think College and the National Coordinating Center (NCC), which expanded IPSE programs. Think College conducts program evaluations and collects information on TPSIDs, including academic, social, employment, and independent living components (Grigal & Hart, 2010).

The HEOA also provided higher education institutions the opportunity to apply for Transitional Postsecondary Institutional Development grants, designed to implement, improve, and expand programs for students with ID on college campuses. Such programs engage students with ID in academic and skill development in numerous areas of adult life, such as career development and job experiences that lead to gainful employment. Programs and initiatives directed towards providing persons with ID with additional skill development and more postsecondary options significantly impact the populations' preparation for the demands of the workforce (Avellone, 2021; Domin et al., 2020).

The COVID-19 pandemic has led to a significant increase in the number of jobs requiring technical skills due to companies continuing to offer remote work options (Hylton et al., 2022; Organization for Economic Co-operation and Development, 2021), which, in turn, has presented challenges for both employers and individuals in the job market (Piroșcă et al., 2021). One central challenge is the mismatch between the technology skills employers desire and the technology skills applicants possess (Lyons et al., 2019). According to a McKinsey survey of youth (persons between the ages of 15 and 24) and employers in nine countries, 40% of employers' main reason for entry-level job vacancies is a lack of skills (Mourshed et al., 2012). In addition, 60% reported recent college graduates were not adequately prepared for the

workforce. Educational systems need to update students' learning profiles to align with the changing nature of the workforce.

Among the many barriers persons with I/DD face with regard to positive employment outcomes, one of the most cited is employers' perception that applicants with ID lack the necessary preparation (Dean et al., 2022; Kulkarni & Lengnick-Hall, 2014). Therefore, equipping individuals with ID for the 21st-century workplace is essential. To that end, it is important to first identify the digital technology skills necessary in today's workforce and then assess whether current IPSE programs preparing individuals with ID for employment include such skills in their curriculum. Only after identifying important digital skills in the workforce and including them into student's career preparation, educational institutions and programs can adequately prepare individuals with ID to participate meaningfully in the 21st-century workforce.

Purpose of the Study

Given the growth in attention to and development of workplace technology in the last decade, information about the digital literacy skills in demand in the post-COVID-19 pandemic job market is needed. This dissertation evaluated whether IPSE programs are equipping individuals with ID with the digital technology skills jobs require in today's workforce. Specifically, this mixed-method research study explored the digital literacy skills perceived as important by U.S. employers and the digital technology preparation available for individuals with ID at IPSE programs. This study's findings will provide a platform for further research and discussion about the preparation in digital technology at IPSE of students with ID for competitiveness in today's high-tech job market.

Research Questions

The overarching research question for this study was: Are IPSE programs for individuals with ID preparing students with the digital technology skills employers deem important in the 21st century? In addition, the study was guided by the following research questions:

1. Which digital technology skills of digital literacy do U.S. employers consider important for entry-level employees at their organization?
    a. How do U.S employers rank the digital technology subskills of digital literacy?
2. What digital technology preparation is available to individuals with ID attending an IPSE program?
    a. Which digital technology skills identified by U.S. employers as important for entry-level employees are included in the digital technology preparation of individuals with ID in an IPSE program?

Conceptual Framework

The successful adoption and use of digital technology in the workplace by people with ID requires a better understanding as part of an effort to ensure they are adequately prepared for the demands of the 21st-century workplace. Therefore, this study's core purpose was to evaluate whether persons with ID are equipped with the basic digital technology skills U.S. employers require in today's workforce. To guide the study, the researcher used the Digital Competence (DigComp 2.0) Conceptual Reference model (Vuorikari et al., 2016).

The Digital Comp 2.0 Conceptual Reference model (Vuorikari et al., 2016) was developed by the European Commission as part of the DigComp 2.2 Framework for Citizens to help guide digital skills development across the European Union and is recognized by the United Nations Children's Fund (UNICEF) as a well-established tool. Applied in over 20 countries

(Nascimbeni & Vosloo, 2019), the model is based on digital competence, defined as using digital technologies to find, evaluate, create, and communicate information (Pérez-Escoda & Fernández-Villavicencio, 2016; Vuorikari et al., 2016). As such, this framework is intended to serve as a practical tool for educators to use in teaching in the classroom and employers to use in developing their workforce.

A consolidated digital competence framework, the conceptual reference portion of the model serves as a guide to ensure people are prepared to use digital technologies effectively. In addition, both employers and educators can use the model to assess individuals' current level of digital competence and identify the areas in which they need to improve. Therefore, the DigComp 2.0 Conceptual Framework reference model (Vuorikari et al., 2016) was an appropriate framework for the current study.

The model provided the researcher with critical research-based components of digital citizenship, or the skills and knowledge needed to effectively use the internet and digital technology (Pérez-Escoda & Fernández-Villavicencio, 2016; Vuorikari et al., 2016). The model was developed to be "user friendly" and provide a comprehensive set of skills and competencies individuals can use to build their digital competence. As shown in Figure 1, the model consists of five areas of digital competence: information and data literacy, communication and collaboration, digital content creation, safety, and problem-solving. The competencies were harvested from over 20 reports and publications on digital skills and competencies needed for employment, personal development, and social inclusion (Carretero et al., 2017; Mattar et al., 2022). The researcher used the reference model to guide the development of the survey developed for the current study to be distributed to U.S. employers to assess important digital technology skills for entry-level employees.

Figure 1

The Digital Competence 2.0 Conceptual Reference Model

Operational Definitions

Digital citizenship – Reference to a person who develops the skills and knowledge to effectively use the internet and other digital technology, especially to participate responsibly in social and civic activities (ISTE, 2017).

Digital divide - The division between people who have access and use of digital media and those who do not.

Digital literacy - The ability to use information and communication technologies to find, evaluate, create, and communicate information; this requires both cognitive and technical skills.

Digital skills - The ability to find, evaluate, use, share, and create content using digital devices like computers and smartphones.

Digital technology - Electronic tools, systems, devices, and resources that generate, store, or process data.

Higher Education Opportunity Act - enacted on August 14, 2008, the law contains several provisions to improve access to inclusive postsecondary education for students with intellectual disabilities. The law includes requirements for financial aid for students with intellectual disabilities and has established a coordinating center, Think College, responsible for providing technical assistance, evaluation, and development of standards and benchmarks for model programs (Higher Education Opportunity Act, 2008).

Individuals with intellectual and developmental disabilities - "…significantly subaverage general intellectual functioning, existing concurrently with deficits in adaptive behavior and manifested during the developmental period, that adversely affects a child's educational performance" (IDEA, 2004).

Inclusive postsecondary education - referred to as inclusive higher education. These programs provide access to people with intellectual disabilities to postsecondary education.

Think College - a national initiative dedicated to developing, expanding, and improving research and practice in inclusive higher education for students with intellectual disability (ThinkCollege.net).

CHAPTER TWO: REVIEW OF LITERATURE

The unemployment rate of individuals with a disability (8.2%) is almost three times higher than that of individuals without a disability (3.3%) for U.S. citizens ages 16 to 64. Additionally, individuals with a disability are much less likely to be employed across all age groups and educational attainment groups than individuals without a disability. These disparities are even more prevalent for individuals with an intellectual disability (ID) (The Organization for Economic Co-operation and Development, 2019), who have the lowest workforce participation rate compared to individuals with different disabilities or those with no disabilities (Almalky, 2020; Qian et al., 2018; Winsor et al., 2021). For example, a Disability Status report generated by Cornell University showed that in 2018, only 28.6% of persons with I/DD aged 21 to 64 (non-institutionalized) were employed in the U.S. (Erickson et al., 2020); that is, 5.8 million persons with ID or a developmental disability of working age (non-institutionalized) were not employed.

These grim unemployment figures have led to many studies investigating the employability preparation for students with ID in K-12 education. Previous research has found various interventions effective in teaching students employability skills. For example, in a single-case meta-analysis, Boles et al. (2019) analyzed 39 studies assessing employment-related interventions that specifically targeted students with I/ID. Four types of interventions were found to have a moderate to strong effect in teaching employment skills, such as repetition, assembly, cleaning, social skills, and transition between tasks/steps, to students with developmental disabilities. However, none of the transition skills were technical – skills needed to use certain tools and technologies required to perform practical tasks. Similarly, Kim et al. (2022) conducted a literature review on technology-based employment interventions for students with autism.

While 33 out of 48 studies used technology devices to teach students vocational skills, none were used to develop students' digital technology skills.

As noted, digital literacy is an increasingly important skill set for individuals to gain employment in the 21st century (Damoah et al., 2021; Khan et al., 2022; Van Laar et al., 2020). Additionally, digital literacy has become a critical part of learning how to function independently for individuals with disabilities (Cihak et al., 2015). Mastery of technology and digital practices has, therefore, become paramount for participation in society. As a result, both education leaders and policymakers have called for digital technology education in classrooms to promote digital literacy (International Society of Technology in Education [ISTE], 2019). However, most research exploring preparation in digital literacy in K-21 education in the U.S. is broad or outdated, pointing to the need to assess digital literacy in K-21 education to provide insight into the digital literacy skills and competencies of high school graduates, including those with disabilities, as they transition into the workforce.

In this chapter, the researcher reviews and critiques the research and scholarship on digital literacy preparation in K-21 U.S. education (both general and special education). Specifically, the review provides insight into how and which digital literacies are taught, the curricula used, and the impact on students' acquisition of critical 21st-century digital technology skills. To date little analytic attention has been directed toward students with ID in terms of accessing digital literacy education, acquiring digital technology skills, and the effects on their postsecondary life outcomes. The researcher addressed this issue by demonstrating the significance of research focusing on the digital technology competencies essential for the 21st-century workforce to inform stakeholders of the importance of providing individuals with ID access to digital technology education during postsecondary education.

Barriers to Employment for Individuals With Intellectual Disabilities

Employers perceive more barriers to hiring persons with ID than any other disability category (Kocman et al., 2018; Lengnick-Hall et al., 2001). Consequently, ID are the largest underrepresented disability population in the workforce (American Association on Intellectual and Developmental Disabilities [AAIDD], 2017; Khayatzadeh-Mahani et al., 2020). Over the last two decades, researchers have closely examined barriers and strategies impacting ID participation in the workforce and have identified individual, environmental, and societal factors as influencing employment for ID (Chan et al., 2018; Cheng et al., 2018; Ellenkamp et al., 2016; Khayatzadeh-Mahani et al., 2019; Lindsay et al., 2018). Among these, individual factors such as education and preparation are most frequently discussed throughout the disability and employment literature (Houtenville & Kalargyrou, 2012; Khayatzadeh-Mahani et al., 2020; Lindsay, 2011). For example, the National Council for Disability (NCD; 2020) reported a disparity between vocational training and employment-related services available to students with and without disabilities. Specifically, students without disabilities were more likely to receive work-based learning opportunities such as job shadowing, internships, part-time jobs, and volunteer work. This is a critical variable as work-based learning prepares students to enter the workforce successfully (Burgstahler, 2001; Lindstrom & Poppen, 2020; McFarlane & Guillermo, 2020), so if students with disabilities are less likely to have these opportunities, they are automatically less competitive than their nondisabled peers in the job market.

Similarly, in a secondary analysis of the 2015 Kessler Foundation National Employment and Disability Survey, Sundar et al. (2018) found many students with disabilities felt as if they were not receiving the educational support, they needed to ensure academic success and employment. According to Sundar and researchers (2018), access to an appropriate education is

one of the most significant barriers to employment faced by people with ID. As a result, education and training during the transition from high school to adulthood for people with ID is an area of focus for improving employment outcomes (Westbrook et al., 2015).

Inclusive Postsecondary Education and Employment for Individuals With Intellectual and Developmental Disabilities

The benefits of individuals with intellectual disabilities obtaining postsecondary education is widely recognized in the HEOA of 2008. Throughout the literature, postsecondary education is identified as a pathway to employment (Grigal & Paypay, 2018; Henderickson et al., 2017; Moore & Schelling, 2015; Prohn et al., 2018). According to Vilorio (2016), higher education levels for individuals with disabilities correlate with lower unemployment rates and higher earnings. Indeed, the influence of higher education on the employment outcomes for people with ID is immense (Grigal et al., 2018). For example, data from Transition and Postsecondary Programs for Students With Intellectual Disabilities (TPSID) Cohort 3, which included data of 494 students with I/ID enrolled throughout 38 TPSIDs, showed 179 students who had paid employment or paid work-based learning while enrolled had earnings at or above the minimum wage (Grigal et al., 2023). Additionally, 50% of these 179 students never held a paid job prior to enrollment. Moreover, Smith et al. (2018), found young adults with ID who participated in postsecondary education services as part of their Vocational Rehabilitation Plan earned up to 51% higher wages than peers who were not enrolled in postsecondary education. In summary, comparisons of employment outcomes between students who attend postsecondary education and those who do not are widely documented and show positive outcomes (Grigal & Dwyre, 2010; Moore & Schelling, 2015; Smith et al., 2012).

Inclusive postsecondary education programs offer coursework to enhance the employability skills of individuals with ID (Grigal et al., 2019b, 2021a) by integrating work experiences and career exploration and preparation opportunities (Papay et al., 2017; Smith et al., 2018). Although IPSE programs are not "employment programs," their employment-related services encompass substantial coursework and activities that demonstrate promising employment outcomes (Grigal et al., 2018). According to several recent Think College reports (Grigal et al., 2018, 2019a, 2021b), engaging in work-based learning (internships, work training, unpaid work experience, and service-learning), job seeking, and paid employment (individual paid job, federal work-study, self-employment) positively impact employment outcome for students in their TPSID demonstration model projects. For example, researchers surveyed Cohort 2 TPSID graduates and found that one-year post-graduation, 59% of respondents had a paid job compared to 17% of adults with developmental disabilities in the general population that year (Grigal et al., 2021b). Briefly, individuals with ID are almost 15 times more likely to obtain a paid job after graduating from a TPSID than those who do not attend (Grigal et al., 2019a).

Impact of the Digital Divide on Individuals With Disabilities

The term "digital divide" is used to describe the gap between individuals who have access to technology and those who do not (National Telecommunications and Information Administration (NTIA; 1999). This divide can have a particularly profound impact on individuals with disabilities, as access to technology can be a critical factor in their ability to participate in society (Van Dijk, 2020). Individuals with disabilities often cannot access the range of opportunities and services available to those without disabilities due to the digital divide (Chadwick et al., 2013; Glencross et al., 2021; Raja, 2016). According to a Pew Research Center report, Americans with disabilities are less likely than those without a disability to own digital

devices such as computers and smartphones and are three times as likely as those without a disability to say they never go online (15% vs. 5%) (Perrin & Atske, 2021). This can significantly impact their lives, limiting their ability to access education, health services, employment, and other vital resources (Tyson, 2015; Van Dijk, 2017).

Physical access is only one layer of the digital divide. Individuals' ability to engage with technology also significantly impacts their use of technology and access to the internet (Van Deursen & Van Dijk, 2019). Thus, even with they have access to technology, many people with disabilities face difficulties using online infrastructure because hardware, software, and online content is typically created for consumers without a disability (Bi et al., 2021; Dobransky & Hargittai, 2006, 2016). Several international studies suggest information and communication technology (ICT) success depends on ICT use (Hossain & Sormunen, 2019; Makinde et al., 2019; Salemink et al., 2017). Consequently, differences in skills and usage of the internet and other technologies have become a focal point for researchers (Van Deursen & Van Dijk, 2011; Van Dijk, 2005). For example, Ramsten et al. (2020) found that young adults with ID do not use ICT as much as their peers. Similarly, in a survey of 180 I/DD on their technology use, Tanis et al. (2012) found although they had progressed in technology acquisition and use, technology remained underutilized by the group. Factors contributing to the underutilization of technology devices for I/DD included lack of information about devices and inadequate training in using devices.

With digital literacy competence, people can find, evaluate, and share information, and understand, interpret, and create digital messages and media (Ferrari et al., 2012; Martin, 2008; Vanek & Movit, n.d.). Obtaining these skills significantly helps I/DD access the same opportunities as their nondisabled peers (Barlott et al., 2020; Khanlou et al., 2021; Moisey & van

de Keere, 2007; Tohara 2021). Therefore, digital literacy for I/DD fosters the use of technology, which, in turn, affords the opportunity to acquire technical skills needed for entry into and success in the workforce (Moisey & van de Keere, 2007).

Digital Literacy in the 21st Century

Digital literacy is a fundamental competency for future education (Organization for Economic Co-operation and Development [OECD], 2018). "Digital literacy" is a broad term that can encompass many different skills. Primarily, digital literacy is the ability to use computer hardware and software, access and interpret digital media, and create and manage digital content (Law et al., 2018).

A systematic literature review on digital skills of the 21st century conducted by Van Laar and colleagues (2017) identified seven core digital workforce skills throughout various fields of study, including technical, information management, communication, collaboration, creativity, critical thinking, and problem-solving. Not surprisingly, in digital literacy research conducted in the last two decades, technical and information skills were the most frequently investigated (Siddiq et al., 2016; Van Laar et al., 2020). In addition, Voogt and Roblin (2012) found that collaboration, communication, digital literacy, citizenship, problem-solving, critical thinking, creativity, and productivity were essential 21st-century competencies internationally and, as a result, recommended that these competencies be integrated into the national curriculum to better prepare society for today's workforce. These findings highlight the attention needed to the digital skills required to participate actively and effectively in today's technology-driven society (Vanek & Movit, n.d.). Sadly, these are skills in which I/DD are typically not prepared or proficient (Baxter & Reeves, 2022; van Holstein et al., 2021).

Literature Search Criteria

A systematic review of the literature published between 2002-2021 was conducted by analyzing peer-reviewed literature, books, and organizational reports focused on digital skills preparation in school-aged K-21 general and special education. The search was achieved through the University of Central Florida's online library databases. The electronic databases and repositories include Education Source, ERIC (Ebscohost), LearnTechLib, ProQuest, and Springer Link. The following search terms were used "digital technology;" "digital literacy" OR "digital skills;" "digital information and data literacy" OR "digital communication" OR "digital collaboration" OR "digital content creation," OR "digital safety" OR "digital problem-solving;" "training" OR "preparation;" "employment" OR "job skills" OR "job training;" and "elementary school" OR "middle school" OR "secondary school" " high school" or "K-12 education." All terms were validated in the ERIC (Ebscohost) thesaurus and are key terms used throughout digital technology and education literature.

In all database searches, limitations were set to English, peer-reviewed, and published in 2002 or later. The starting point was selected based on the emphasis during the time on education reform that targeted science, technology, engineering, and mathematics (STEM) in the United States (Chesky & Wolfmeyer, 2015), leading to a focus on computer literacy skills (Christensen, 2019). Also, international studies were excluded as the study was focused on digital literacy in the U.S. Additionally, studies including students with ID in inclusive postsecondary education were included. In the U.S, students qualify for special education services until the age of 22 in most states, which offers students with disabilities access to K-12 education past the traditional age (Pub.L. 101-476). As a result, some students attend inclusive postsecondary education while

still in high school. Data extracted from the articles included digital literacy frameworks or models, interventions, curricula, practices or strategies, and skills or competencies.

Using the search parameters, the five databases returned 79 articles. After removing all duplicates, the researcher examined the titles and abstracts of the remaining articles for relevance. Many otherwise relevant studies were removed because they were conducted outside the U.S. Several other studies were removed due to their focus on K-12 educators' digital literacy competence or perceptions as well as a lack of empirical evidence. This process resulted in 10 studies meeting the criteria. One additional article was found through a reference list search of a study that met the criteria. A summary analysis of the 11 articles that met study requirements is presented in alphabetical order of authorship in Table 1.

Table 1

Summary of Literature Review

Reference	Population/sample	Measures	Outcome
Cihak et al. (2015a)	Three high school students with an intellectual disability	Digital literacy skills: emailing, bookmarking, cloud storage, and document upload	All participants acquired and maintained the digital literacy skills taught.
Cihak et al. (2015b)	4 individuals with an intellectual disability (postsecondary education)	Emailing across digital devices	All participants successfully generalized the ability to use email across multiple platforms.
Curran and Ribble (2017)	K-12 and college students	P-20 model	The REP model is a viable framework for teaching digital citizenship in P-20 education.
Dogan and Robin (2008)	31 K-12 educators	Teachers' use of digital storytelling in the classroom	After professional development in digital storytelling, more than half of the teachers did not implement the tool, although digital storytelling increased students' technical, presentation, research, organizational, and writing skills.
Gleason and Von Gillern (2018)	Three participants in high school	Teens' Twitter participatory practices	The social media digital citizenship framework gives students opportunities to develop digital citizenship and digital media software and application skills.

Reference	Population/sample	Measures	Outcome
Gretter and Yadav (2016)	Middle/high school	The Computational thinking Media and informational literacy model	The complementary relationship between the CSP framework and the UNESCO framework can guide teachers in providing students with comprehensive skills to produce and navigate digital content (p. 6).
Hutchinson and Evmenova (2022)	Students with high-incidence disabilities	CSIP+ model	This instructional strategy for incorporating computational thinking and coding into subject-matter education offers educators a starting point when thinking about the connections between subject-matter instruction, programming, and coding for students of all skill levels.
Lauricella et al. (2020)	K-5 teachers $N = 585$	Digital citizenship curriculum and competencies	Teachers of students in elementary schools educate students about digital citizenship. There are differences in concepts being taught depending on the school setting, racial demographics, and student grade (p. 5).
Lee et al. (2021)	Two kindergarten and second-grade teachers and their students	I-LEARN model impact	Each teacher developed their own approaches to the I-LEARN curriculum. Students' outcomes were influences by various school and teacher characteristics.

Reference	Population/sample	Measures	Outcome
Reynolds (2016)	679 students from 38 schools	Constructivist digital literacy skills	The proposed framework impacted students' social constructivist digital literacy skill use and acquisition at school. A relationship between changes in students' digital practices at home and change in other dimensions was not present (p. 25).
Warschauer (2007)	10 K-12 schools in California and Maine	Information literacy and research skills	Access to one-on-one laptops significantly impacted educators' approach to teaching digital literacy skills. Students acquired information literacy and research skills. Educators' approach to teaching digital literacy impacted students' learning experience and skill acquisition.

Digital Literacy Curriculum, Interventions, and Frameworks

According to Curran and Ribble (2017), children should begin learning digital technology skills and practices as soon as they start using technology. This is particularly important for individuals with ID, often they require more time to acquire and reach mastery of a skillset (Algahtani, 2017).

Curriculum and Interventions

A study by Lee et al. (2016) investigated the I-LEARN model with kindergarten and second-grade students and teachers in Philadelphia. The I-LEARN model is an integrated framework informed by the digital divide and the results of information and digital literacies research. The model comprises six stages: Identity, Locate, Evaluate, Apply, Reflect, and Know. The last three stages directly address learning and how information is used to create and present new knowledge, which differs from previous models such as Eisenberg and Berkowitz's (1900) "Big Six" and Kuhlthau et al.'s (2008) "guided inquiry."

Three teachers participated in the study. However, only two teacher's students' data were available for data analysis – one kindergarten teacher with 23 students and a second-grade teacher with 25 students. Researchers conducted three professional development sessions for teachers and provided extensive support during implementation. Students were required to develop a "Little Bird Tales," which required them to select images and pictures and record a narration of their individual "tales." In addition, they had the option of creating and recording visual and audio representations of their stories. A mixed-methods methodology was used to collect teacher data by incorporating the Technological, Pedagogical, and Conceptual Knowledge (TPACK) survey (Koehler et al., 2011), teacher interviews, and students' artifacts.

The study's results supported the I-LEARN model's effectiveness in teaching students' information and digital literacies. However, researchers noted that technology access, classroom integration, and meaningful use (Hohlfed et al., 2008) are required for proficiency in information and digital literacies. Additionally, the study revealed that to successfully implement digital literacy education in schools, a differentiated and individualized approach to professional development in digital literacy is needed. Consequently, the study made it clear that the student-based method of the I-LEARN model poses some implementation challenges. Specifically, motivating and training teachers using standard teaching and learning philosophies was a barrier. The differences between the educator's teaching style/approach and digital competence resulted in different learning experiences and outcomes for their students. Nonetheless, the project showed promise by emphasizing 21st-century digital and information literacy skills within the framework of the I-LEARN model.

Another model designed to develop early learners' digital skills is the REP model (Ribble, 2015), which assists educators in developing and implementing a digital citizenship curriculum in P-20 settings or preschool through postsecondary education learning environments. The model used the principle of Respect, Educate, and Protect to create a responsible digital citizen. Curran and Ribble (2017) provided examples of how elementary, middle, high schools, and college educators have adopted the curriculum to instruct and guide students in properly using and valuing digital technology, digital social participation, and justice-oriented digital citizenship. The curriculum covers various digital citizenship elements that fit within the three themes of the model throughout students' educational career. For example, K-2 grades learn digital etiquette within the Respect curriculum, digital literacy within the Educate curriculum, and digital rights and responsibilities within the Protect curriculum. On the other

hand, the 6-8 grade band learn digital law within the Respect curriculum, digital commerce within the Educate curriculum, and digital health and welfare within the Protect curriculum. In addition, the model considers the developmental appropriateness of the digital citizenship skills acquired within the model as the student progresses through P-20.

Educational Frameworks

Educational frameworks provide educators with models for achieving learning outcomes (Travers et al., 2019). Reynolds (2016) examined the results of using a conceptual instructional design framework in developing various constructivist digital literacy skills among students. Using a longitudinal non-experimental survey design, Reynolds (2016) defined six creative task-driven domains (create, manage, publish, socialize, research, and surf/play) to form essential aspects of digital literacy. With 679 students from 38 middle and high schools in West Virginia, researchers demonstrated through a pre-/post-survey that implementing the game design software intervention *Globaloria* effectively increased students' engagement in activities within each of the frameworks' practice domains. Researchers defined "social constructivist digital literacy" as six practice domains extracted from the social constructivism and constructionist literature. The *Globaloria* software incorporates 20 task-driven activities to engage students in developing digital artifacts. Students use various resources to demonstrate multiple practices such as "graphic design, information resource uses, social media communication, posting/publishing, and reviewing and deconstructing existing games and other worked examples" (Reynolds, 2016, p. 743). Study results showed that using the conceptual framework along with the game design intervention successfully motivated students' engagement and fostered social constructivist digital literacy.

In another article examining digital literacy frameworks, Gretter and Yadav (2016) proposed an integrated framework for developing 21st-century digital skills among students. The researchers integrated the frameworks of the United Nations Educational, Scientific and Cultural Organization (UNESCO) (Wilson et al., 2013) and the Advanced Placement Computer Science Principles curriculum framework (CSP) (College Board, 2014) to outline the commonalities between the two models. The researchers asserted that the two frameworks complement each other and, therefore, suggested that they could be used to increase students' digital competencies and digital participation. By taking essential components from both frameworks, the researchers came up with seven Big Ideas (creativity, abstract, data and information, algorithms, programming, the internet, and global impact) to guide their investigations in promoting computational thinking and media and information literacy to students and teachers.

In addition, Gretter and Yadav (2016) proposed using the programming software *Scratch* to introduce computational thinking and media and information literacy skills to students. According to the researchers, *Scratch* is an excellent tool for first-time programmers because it promotes digital fluency while allowing students to create digital artifacts like simulations, music, videos, games, and interactive art. Additionally, the software facilitates the technical and social, and communicative aspects of computing, thereby creating space for educators to incorporate the seven big ideas into programming activities. Thus, in addition to exposure to the competencies expressed in the "big idea" from the merging of the two frameworks, students also foster various digital skills through *Scratch*, such as coding/programming, media literacy, digital communication and collaboration, digital creativity, digital content and information evaluation, and other digital literacy skills.

Digital Literacy Skills and Competencies

Digital Citizenship

Digital citizenship is a critical component of the International Society of Technology in Education (ISTE) standards (ISTE, 2017). The ISTE Digital Citizenship standards promote engagement with technology in a positive, safe, legal, and ethical manner. Teaching digital literacy through a digital citizenship curriculum was found to be a major theme in this literature review. For example, in a qualitative study of K-5 teachers, Lauricella et al. (2020) examined the teaching of digital citizenship during early elementary grades. Using an online survey administered to a national sample of 585 teachers in the United States, the authors found that teachers educated elementary-grade children on various concepts of digital literacy, thus demonstrating that elementary educators are starting to educate their students on digital citizenship, including how to use the internet and function in the digital environment. However, the skills and competencies related to digital citizenship taught at the elementary level depended on students' age group, the school's racial composition, and the school setting, and as a result, not all dimensions of digital citizenship were taught.

The digital citizenship elements examined by Lauricella et al. (2020) included media balance and well-being, safety and privacy, digital footprint and identity, communication and relationship, cyberbullying, digital drama and hate speech, media literacy, and news. Among the sample, most participating teachers preferred teaching digital competencies related to developing positive features and behavior in their students, such as safety, privacy, cyberbullying, and hate speech, which are all related to upholding behavior and characteristics of respect, kindness, and consideration for other people online and offline. Moreover, Lauricella et al. (2020) determined that veteran educators had a more negative attitude toward digital learning competencies, while

newer educators were more open toward digital literacy education. Therefore, Lauricella and colleagues' (2020) findings suggest digital literacy competencies taught in U.S. elementary schools are still dependent on the school settings, the experience of the teachers, and other factors such as ethnicity.

Gleason and Von Gillern (2018) proposed a social media-facilitated approach to teaching high school students' digital citizenship. The researchers discussed three learning experiences found helpful in fostering digital citizenship via social media. The first experience was a digital research project. One project component involved students creating a public service announcement informing others of something they are passionate about (e.g., women's rights, food waste). Next, the students and teacher determine which social media outlet is best suited to disseminate their announcement to connect with their targeted audience. These choices allow students to consider various elements such as digital content creation, digital identity, privacy, copyrights, and publication. The second component of the project involved students connecting with elected officials through their websites to advocate for or against a position or legislation. This activity allows students to "investigate issues, prepare arguments, and connect with an elected official" (Gleason & Von Gillern, 2018, p. 203).

Gleason and Von Gillern (2018) discussed the third activity by sharing the findings of a study they had conducted investigating the participatory practices of adolescents using Twitter. The two-year qualitative study examined the effectiveness of a social media-facilitated approach in helping students develop digital communication, digital content creation, and digital research skills and citizenship practices rooted in social justice. Three high schools participated. Participating students committed to engaging on Twitter to contribute information about becoming digital citizens. Students posted and shared information and commented on others'

posts on several topics, such as the 2012 U.S. presidential elections, school funding, Relay for Life, and intersectional feminists. The study found the social media-enabled digital citizenship approach advantageous in providing students the opportunity to foster and apply digital citizenship skills in the real world, making social media an effective way for students to spread their ideas as digital citizens through civic participation.

Information Literacy

Warschauer (2007) conducted a study on students' digital access and technology skills. In this multisite case study, the researcher analyzed interviews, surveys, and teachers' and students' artifacts to assess students' information literacy and research skills from 10 K-12 schools in California (n = 7) and Maine (n = 3) in urban, suburban, and rural settings. Students in Grades 2-12 were represented in the sample. In addition, through a piloted one-on-one laptop program, Warschauer (2007) specifically investigated patterns of information use and research in laptop classrooms and the differing approaches according to the social context of the school.

Warschauer (2007) found that students learned to access, manage, and incorporate information into their written and multimedia artifacts. However, how students evaluated information, understood the social context of the information, and analyzed it for knowledge production varied across schools. According to the researcher, schools' success at fostering information literacy and research skills in students was contingent on their approach to teaching digital literacy. The study concluded that one-on-one laptops are valuable in promoting students' information literacy and research skills. However, schools' socioeconomic context, visions, and values all play a significant role in determining how laptop programs are implemented, which, in turn, impacts the outcome. Some schools in the sample limited themselves to teaching the procedural functions of computer and Internet use, while others promoted scholarly approaches

such as data collection and analysis. For example, some educators discussed the value of students accessing information on the Internet when needed, while others incorporated research projects and weekly activities requiring students to use various skills to navigate the internet. Warschauer's (2007) study highlighted how school characteristics impact students' access to digital technology and how students are taught digital literacy and what skills they are taught.

Digital storytelling has been used to meet the ISTE Technology Standards (Dogan & Robin, 2008). According to Dogan and Robin (2008), educational technology can foster 21st-century skills, such as information literacy, creativity, decision-making, and communication. Using survey methodology, the researchers assessed K-12 educators on integrating the digital storytelling tool in the classroom, the use of the tool, and the barriers that prevented teachers from using it after attending a digital storytelling workshop. The researchers also recruited a focus group of educators to conduct interviews for more in-depth information about specific topics. Thirty-one participants were selected through opportunity sampling. Dogan and Robin (2008) concluded that educators' perceptions of using digital stories were positive after the workshop. However, only half of the teachers implemented the tool, and out of those many did not use it as much as the authors had predicted. Time issues and access to technology were the most significant barriers reported by teachers to implementing the tool. Regarding students' outcomes, teachers reported an increase in students' technical, presentation, research, organization, and writing skills, as well as an increase in motivation and engagement levels. In sum, Dogan and Robin's (2008) results suggest digital storytelling is a viable approach to teaching K-12 students digital literacy skills. However, successful implementation of educational technology tools depends on various factors, such as access to technology, proper training, buy-in from educators and administrators, and ongoing technical support.

Digital Literacy Pedagogy

Several studies referenced in Table 1 demonstrate digital literacies are being taught in K-12 education in the U.S. through student-centered learning approaches. Student-centered learning aims to build student motivation, engagement, and confidence, which is beneficial when learning new competencies (Morel, 2021; Walt & Barker, 2020; Weidman & Wright, 2019). In all empirical studies, students acquired digital literacies through experiences that encouraged them to be independent and self-motivated learners. For example, the two coding software tools, *Globaloria* and *Scratch*, discussed by Reynolds (2016) and Gretter and Yadav (2016), allowed students to take ownership of their learning and actively participate in the process by designing and evaluating digital games.

Additionally, multiple studies encouraged students to learn by doing. Most studies required students to create digital content or artifacts thereby engaging them in discovery-based learning. Through discovery-based learning, students better understand the content and become more engaged in the learning process (Reynolds, 2016). Researchers specifically assessing students' digital skill acquisition analyzed data from student-developed products. For example, student participants in the I-LEARN study and the DISTCO contest created digital stories (Dogan & Robin, 2008; Lee et al., 2021), students with ID created emails using various digital communication and information and data literacy skills (Cihak et al., 2015a; 2015b), and students learned digital citizenship skills by creating public service announcements, persuasive emails, and Twitter posts (Gleason & Von Gillern, 2018). According to reports from teachers in Warschauer's (2007) study, providing students with hands-on, real-world learning opportunities allowed the students to think critically and develop problem-solving skills. By engaging in the exploration process while creating digital content and artifacts, students were empowered to

draw meaningful connections between digital literacy concepts and build their own unique solutions, skills required in the 21st-century workforce (Van Dijk, 2017).

Digital Technology Instructional Model for Students With Disabilities

According to Israel et al. (2015), providing computer skills for K-12 students, both with and without disabilities, can open the door to a variety of career paths and educational benefits. In the case of students with disabilities, many techniques are available to special educators to increase the chances of these children succeeding in computing instruction. For example, Hutchison and Evmenova (2022) discussed the Computer Science Integration Planning Cycle Plus (CSIP+) model. CSIP+ incorporates the technology integration planning cycle, an existing instructional planning tool by Hutchison and Woodward (2014), the universal design for learning (UDL) cycle of instructional planning (Rao & Meo, 2016), and UDL guidelines and checkpoints (Center for Applied Special Technology [CAST], 2018). The model is designed to guide teachers in planning and delivering computer science instruction such as programming and coding for students with high-incidence disabilities. Students with high-incidence disabilities were defined as students with mild ID, learning disabilities, and emotional and behavioral disorders. Students with low-incidence disabilities were not discussed.

The CSIP+ model includes five steps (Instructional Goals and Outcomes, Instructional Approach and Assessment, Digital Contribution to Instruction, Logistical Constraints, and Reflection and Instructional Considerations) accompanied by a list of questions that guide educators through lesson planning and delivery. Like some of the frameworks mentioned before (Gretter & Yadav, 2016; Reynolds, 2016), this model includes the use of the coding software *Scratch/Scratch Jr*. The authors asserts that the CSIP+ model is helpful by providing educators with a starting point for designing instruction in digital technology that is accessible and

effective for all students by integrating the evidence-based principles of UDL and the research-based technology integration planning cycle.

Digital Literacy Skills and Competencies for Students With Disabilities

Digital literacy skills are necessary for all learners in the 21st century (Barlott et al., 2020; Ramsten et al., 2020), including students with disabilities. In a qualitative study examining three high school students with an ID, Cihak et al. (2015a) found that digital literacy skills allowed students to participate actively in the digital society. By recognizing the digital divide between individuals with disabilities and those without, the researchers set out to promote utilizing digital technology to target specific skills deficits to teach students with ID to access the digital community. Specifically, using a multiple-probe design, Cihak et al. (2015a) examined the relationship between digital literacy instruction and the acquisition and maintenance of three essential digital literacy skills; emailing, cloud storage, and bookmarking. Students received instruction on sending and receiving emails, organizing social bookmarking to save, share, and access job searches, and accessing cloud storage to download, revise, and upload documents.

Data showed all participants readily acquired the functional skills and maintained them nine weeks later. During instruction, all students independently replied to emails, composed, and sent new emails, researched career websites, bookmarked at least one career website, signed into cloud storage, downloaded a document, revised the document, and uploaded a document. Thus, by incorporating digital technology skills in their instruction, students with ID can effectively improve their functional, academic, and independent living skills.

The study also highlights the influence instructional practices have on students' learning. Specifically, study results support systematic instruction as an effective strategy to teach students with disabilities new skills. Using pictorial screenshots, modeling each digital literacy skill, and

providing help with the system of least prompts proved to be effective instructional practices in teaching students with ID digital literacy skills. Teaching students with ID how to communicate and access information and other digital tools equipped them with a transferable skillset that can be used in school and on the job. Cihak et al. (2015a) findings demonstrated how obtaining digital technology skills can help bridge the digital skill gaps for individuals with ID. Despite a small sample size of three students, the study results support existing literature on the ability of individuals with more significant disabilities to acquire information and communication technology skills and the impact of these skills on participation and socialization in society (Barlott et al., 2020; Ramsten et al., 2020).

With the same goals, but in a postsecondary educational context, Cihak and colleagues (2015b) examined the effects of teaching individuals with intellectual disabilities how to send and receive emails. The researchers used a multiple-probe design to investigate the impact of digital literacy teaching on four students with ID ability to access, respond to, and send emails independently across various devices (Windows desktop computer, laptop, and an iPad tablet device). Participants' ages ranged from 21 to 23, and their IQ ranged from 51 to 70.

Each student had little prior experience with the intervention's technology. Further, at the start of the study, none of the students owned a laptop computer, iPad®, or had previous experience with an Apple® MacBook Pro. However, all four participants were comfortable with the fundamental features of a Windows desktop computer (i.e., turning on and off, using a mouse to click desired icon, and using the keyboard) learned in high school. Furthermore, all participants had little familiarity with email. A total of 21 task-analyzed steps were required for them to be able to email independently. Screenshots of each task-analyzed stage were made, printed, and utilized to demonstrate how to access, respond to, compose, and send an email using

each device. Students needed an average of seven sessions to be able to email independently, with an average of 86% of the task-analyzed steps completed independently on a desktop, five sessions to email independently, with an average of 94% of the task analyzed-steps completed independently on a laptop, and five sessions to email independently, with an average of 89% of the task-analyzed steps completed independently on an iPad.

Similar to the results in the previous study (Cihak et al., 2015a), the postsecondary study findings also pointed to a functional relation. That is, after nine weeks, all four participating students with ID received three distinct emails from their instructor, each of which needed a response on one of the three platforms. All participants generalized their ability to utilize email across numerous platforms effectively. Furthermore, they correctly answered the instructor's questions, suggesting that they understood the email message and continued being able to correspond nine weeks later.

Students with intellectual disabilities benefit from becoming familiar with a range of communication technologies to improve their educational, employment, and independent living capabilities (Baxter & Reeves, 2022; Hutchison & Evmenova, 2022). The study implications are significant for employment since the benefits of networking extend beyond the employer-employee relationship. Because people use computer technologies personally and professionally daily, digital literacy is an important skill to in being able to live independently. Both studies conducted by Cihak and colleagues (2015a, 2015b) suggest individuals with ID can acquire the skills to perform basic digital literacy skills when explicitly taught using evidence-based strategies.

Relationship to the Current Study

Today, most careers require digital proficiency (Piroșcă et al., 2021; Vanet & Movit, n.d.), and as digital literacy is deemed a critical job skill in the 21st century (Chalkiadaki, 2018; Van Laar et al., 2017), students in IPSE programs who desire to obtain a job need preparation in digital technology skills. Interest in inclusive postsecondary education for students with ID is expanding, and enrollment rates are growing nationwide (Grigal et al., 2021a). In 2020, approximately 6,440 students with ID were enrolled in transition and postsecondary programs (Grigal et al., 2020), and as of 2023, there are 317 programs in the U.S. providing individuals with ID postsecondary preparation.

While the studies referenced in Table 1 provide a synopsis of various teaching frameworks and approaches to digital literacy in K-12 education in the U.S, more research is needed on digital literacy for persons with ID. Only 2 of the 11 articles meeting criteria examined digital literacy skills for individuals with ID (Cihak et al., 2015). Additionally, among the various frameworks found throughout this search, only one article proposed an instructional model for teaching students with significant disabilities digital technology skills. While students with disabilities may have been included in other study samples, no researchers disaggregated the data to report the population's performance or learning outcomes specifically. Therefore, there is no way to confirm whether students with disabilities were or were not included.

Technological improvements have profoundly altered how we navigate our daily lives, but these advancements are inconsistently mirrored in U.S. K-12 educational institutions (Swinton & Williams, 2018). This is significant because digital skills are acquired over time through educational and social use of technology, formal education, independent learning, and peer learning (Leahy & Wilson, 2014). Therefore, to prepare students with ID for postsecondary

life, it is crucial to incorporate technology and digital literacy skills into their transition plans (Baxter & Reeves, 2022). This is especially true if students have only had limited technology-related experiences during their K-12 education. Students with ID require technical abilities like those of their peers to succeed in living independently and participating in social life, such as going to college and obtaining employment (Baxter & Reeves, 2022; Bergson-Shilcock, 2020; Cihak et al., 2015b).

As demonstrated, this literature review supported the researcher's hypothesis that the digital technology skills preparation in current IPSE programs does not parallel the digital technology skills in demand in the U.S. workforce. As supported by the existing literature, acquiring digital literacy skills is necessary in K-21 education to impart the skills and competencies for students to be innovative, creative, competent, and competitive in the digital world (Fuller, 2020; Trust, 2018). However, more research on digital literacy for individuals with more significant disabilities is clearly needed.

Summary

This review of literature has depicted the various approaches and curricula used to teach digital literacies in K-21 general and special education in the U.S. Although still limited, the literature on this topic provides insightful information to stakeholders interested in students' competence and proficiency in the skills required in today's workforce. Overall, the literature reflects digital literacy elements such as digital citizenship (Curran & Ribble, 2017; Gleason & Von Gillern, 2018; Lauricella et al., 2020), coding, and programming (Gretter & Yadav, 2016; Hagge, 2018; Reynolds, 2016) as common skills taught to students in K-21. Additionally, the literature highlights several factors influencing if and how digital literacies are taught in K-21 education in the U.S. Factors include technology access (Lee et al., 2021; Warschauer, 2007),

educators' age and years of teaching experience (Lauricella et al., 2020), educators' digital literacy competence and self-efficacy (Lee et al., 2021), and various schools characteristics (Lauricella et al., 2020; Warschauer, 2007). However, the most significant finding of this literature review is the lack of research on digital literacy for individuals with ID.

CHAPTER THREE: METHODOLOGY

In this study, the researcher identifies the digital technology skills important in the 21st-century workforce as perceived by U.S. employers and assesses the digital technology preparation in Inclusive Postsecondary Education (IPSE) programs for students with intellectual disabilities (ID). The study does not include digital literacy in K-12 education for students with ID because the ISTE Standards have been adopted in all 50 states for K-12 grade bands whereas no parallel standards exist for IPSE programs, making their impact unknown.

This chapter presents the methodology and procedures used in this mixed-methods study. Specifically, the chapter describes the framework guiding the research, research questions and design, participant selection and recruitment, instrumentation, and data collection process. Also addressed are instrumentation reliability and validity, threats to validity, and ethical procedures followed during the study.

Theoretical Framework

Digital literacy is a crucial enabler for taking advantage of digital opportunities and engaging in digital activities (Nipo et al., 2020). Therefore, this study is grounded in a framework that promotes digital skills, literacies, and competence, the Digital Competence (or DigComp 2.0) Conceptual Reference model (Vuorikari et al., 2016). The framework builds upon the idea that digital literacy consists of various fundamental components for successfully navigating a digitalized society.

The European Union introduced the Digital Competence (DigComp 2.0) Conceptual Reference model (Vuorikari et al., 2016) to identify and define the digital competence areas

necessary to participate successfully in an increasingly digital society. The model is based on the European Digital Competence Framework for Citizens 2.0 (Nascimbeni & Vosloo, 2019). The DigComp 2.0 Conceptual Reference Model (Vuorikari et al., 2016) is a framework for developing digital competencies for all citizens of the European Union. The model consists of five areas of digital competence: information and data literacy, communication and collaboration, digital content creation, safety, and problem-solving – all of which were mentioned throughout the 21st-century digital skills literature as being essential for success in the workplace (Van Laar et al., 2017, 2020).

The competence areas represent the highest level of digital literacy, to include identifying and solving problems, creating and using digital content, and communicating and collaborating effectively in a digital environment. The competence areas are further divided into 21 competencies, skills, and knowledge. The skills are at the intermediate level, which refers to using digital technologies to access and manage information, communicate, and collaborate online, and create digital content. For example, the Information and Data Literacy category centers on the use of digital devices and services and understanding and applying digital information. The Digital Safety category focuses on the ability to navigate online safely. The Digital Content Creation category emphasizes the ability to create digital products, services, and content. The Digital Communication and Collaboration category concentrates on the ability to communicate, collaborate, and interact effectively in a digital environment. Lastly, the Digital Problem-Solving category underscores the ability to identify, analyze, and solve digital problems.

The DigComp 2.0 Conceptual Reference Model (Vuorikari et al., 2016) is a valuable tool for determining citizens' appropriate level of digital competence. In addition, it can be used to

create educational and training programs to address identified gaps and assist organizations and businesses in assessing their employees' level of digital competence. Although several models also exist in the U.S., such as the Technological, Pedagogical, and Content Knowledge or TPACK model (Mishra & Koehler, 2006), the Partnership for 21st Century (P21) model (Partnership for 21st Century Skills, 2008), and the ISTE Standards (2017), these frameworks are primarily used in academic settings. Therefore, many of their components are domain-specific and would require several modifications to be used in the current study. Additionally, the language used in these models may be unfamiliar to individuals in sectors or industries outside of the field of education. Regarding the framework selected in the current study, the researcher was able to implement the competence areas and subskill sets into the study with minimal modifications. Specifically, the researcher used the model to operationalize the independent variable and, thus, was able to develop an instrument specifically targeting the construct being measured in the study.

Problem Statement

The Institute for Corporate Productivity (i4cp; Goodridge, 2019) surveyed 466 respondents from organizations with a thousand or more employees and found that of the of organizations employing people with disabilities (75%), only 49% employed persons with ID. Emerging learning deficits created by rapid technological advancements place persons with ID at a more significant economic disadvantage for obtaining employment (Bolstad et al., 2012; Chetty et al., 2017). Digital literacy is essential to employability and thus critical to one's financial well-being and success (Chalkiadaki, 2018). This is especially true in the 21st century, where digital technology is integral to communication, education, and employment (Henderson & Tilley, 2018).

Yet, according to Tyson (2015), individuals with disabilities are less likely to receive digital technology preparation and, therefore, more likely to be excluded from the digital economy (Lyons et al., 2019). Beyond the personal cost to these individuals' quality of life and happiness, excluding this population has a significant impact on the nation's economy. That is, about 17% of Americans have a developmental disability, thus accounting for over $300 million per month in social security and Medicare funding (U.S Bureau of Labor Statistics, 2021).

Identifying the digital skills important in today's workforce and assessing the digital technology preparation in IPSE programs will provide stakeholders with insight into critical skills that should be included into the educational and employment preparation offerings of students with ID to increase their competitiveness and workforce participation.

Research Questions

The overarching research question for this study was: Are IPSE programs for individuals with ID preparing these students with the digital technology skills U.S. employers deem important in the 21st century? The study was guided by the following specific questions:

1. Which digital technology skills of digital literacy do U.S. employers consider important for entry-level employees at their organization?
    a. How do U.S employers rank the digital technology subskills of digital literacy?
2. What digital technology preparation is available to individuals with ID attending an IPSE program in the U.S?
    a. Which digital technology skills identified as important for entry-level employees by U.S employers are included in the digital technology preparation of individuals with ID in an IPSE program in the U.S?

The researcher hypothesized that IPSE programs' digital technology skills preparation would not parallel the digital technology skills in demand in the U.S. workforce.

Research Design

Mixed-methods approaches were used to collect and analyze data. Survey research methodology was used to collect data from U.S. employers to determine their perception of the importance of five digital literacy competencies at their organization. Content analysis was used to identify the digital technology skills presented within the texts of IPSE programs' course offerings and syllabi. Figure 2 illustrates how the researcher integrated the two approaches, and Tables 2 and 3 present a visual analysis of the research design blueprint of this study.

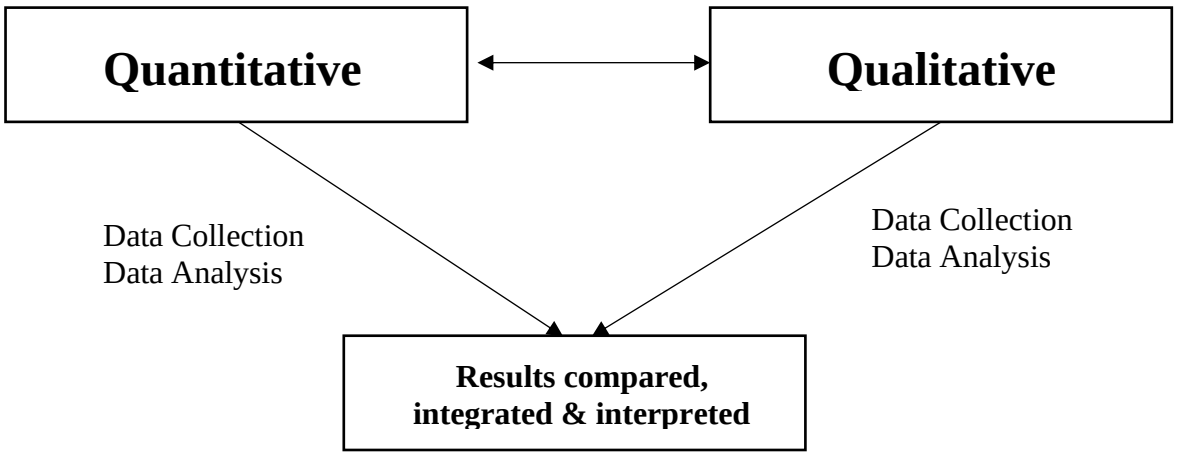

Figure 2

Study Flow Chart

Note: A visual diagram of the mixed-methods concurrent triangulation strategy. Source: (Atif et al., 2013)

Table 2

Quantitative Research Plan

Research question	Construct	Instrument	Level of measurement	Sample	Analysis
Which digital technology skills of digital literacy do U.S. employers consider important for entry-level employees at their organization?	Perception	Survey	Ratio	100 U.S. employers	Descriptive
How do U.S. employers rank the digital technology subskills of digital literacy?	Perception	Survey	Ratio	100 U.S. employers	Descriptive

Table 3

Qualitative Research Plan

Research Question	Data needed	Data type	Data source	Sample	Analysis
What digital technology preparation is available to individuals with ID attending an IPSE program in the U.S?	Digital tech skills/ competencies	Text	Documents, webpages, & emails	83 IPSE programs	Content analysis
Which digital technology skills identified as important by U.S. employers are included in the digital technology preparation of individuals with ID in an IPSE program in the U.S.?	Digital tech skills/competencies	Text	Documents, webpages, & emails	83 IPSE programs	Content analysis

Quantitative Methodology

Participants

The researcher recruited 100 ($N = 100$) employers in management at organizations in the U. S. The sample consisted of administrators on various levels such as directors (21%), owners (18%), managers (18%), and chief executives (17%). Seventy-four percent of the sample organizations employed individuals with disabilities; 71% reportedly offered customized integrated employment – a process for achieving competitive integrated employment for persons with disabilities through a relationship between employee and employer that is personalized to meet the needs of both (https://dol.gov) – and customized training for individuals with disabilities. Most of the sample were in the computer and technology (21%), finance and economics (17%), and construction (11%) industries. See Table 4 for additional demographic details of the sample.

Table 4

Demographic Characteristics of Participants

Participant characteristics	*N*	%
Region		
Northeast	27	26.73%
Southeast	24	23.76%
Midwest	19	18.81%
Southwest	13	12.87%
West	18	17.82%
Size classification		
Micro (>10 employees)	17	17.00%
Small (10 to 49 employees)	13	13.00%
Medium (50 to 249 employees)	24	24.00%
Large (>250 employees)	46	46.00%
Business designation		
Public	24	24.00%
Private	66	66.00%
Not Applicable	10	10.00%

Participant characteristics	*N*	%
Industry		
Computer and technology	21	21.00%
Finance and economic	17	17.00%
Construction	11	11.00%
Food and Beverage	7	7.00%
Manufacturing	6	6.00%
Education	4	4.00%
Advertising and marketing	2	2.00%
Other	6	6.00%
Occupation		
Chief executive officer (CEO)	17	17.00%
Owner	18	18.00%
Vice president (VP)	9	9.00%
Director	21	21.00%
Manager	18	18.00%
Chief information officer (CIO)	3	3.00%
Chief technology officer (CTO)	2	2.00%
Other	12	12.00%

Recruitment

Commercial and market research platforms are becoming more popular due to the recent rise of online survey use (Heen et al., 2020; Miller et al., 2020). Qualtrics©, an online survey platform that offers various online research services and tools, Qualtrics© acted as a third-party online host for the study, providing numerous automated quality checks and data scrubs designed to help deliver quality data (Berry at el., 2022). As a result, the researcher selected Qualtrics© over other professional panel data providers such as Nielsen, Research Now, Kantar, and Ipsos. Additionally, the University of Central Florida provides access to many of Qualtrics© ' analytical tools free of charge to students.

Through Qualtrics© sampling services, for a fee, the researcher was able to access a pool of potential participants who had previously agreed to be solicited for survey recruitment.

Qualtrics©'s network of participants, also known as a market research panel, consists of hundreds of suppliers with diverse recruitment methodologies (Qualtrics© , 2005). Respondents can be recruited from a variety of methods, including the following:

- Network ads and promotions
- Membership referrals
- Social networks
- Online and mobile games
- Affiliate marketing
- Banner ads
- TV and radio ads
- Offline mail-based recruitment campaigns

Additionally, Qualtrics© provides several features to ensure quality responses from real participants. For example, the platform uses Google's reCAPTCHA (or Completely Automated Public Turing Test to tell Computers and Humans Apart) technology, to detect the likelihood that a response came from a bot rather than a human participant (Qualtrics©, 2023). Also, researchers can embed a Captcha verification in the questionnaire to ensure the survey is not being spammed and input attention checks, which screen out participants who complete the survey too fast or engage in "straightlining," providing the same answers to get through the questions quickly. These features help produce quality responses and reliable data.

According to Litman and Robinson (2020), compensating respondents for participating in online surveys increases participation and response rates and, thereby, improves data. During

recruitment, participants are offered an incentive to participate. Qualtrics© compensates each respondent differently according to what the participant prefers. For example, airlines may offer airline miles as compensation, or somebody who has been recruited by a retail shop may be compensated with store credit or points. Regardless, participants agree to the incentive before taking the survey and receive their compensation within five business days after successfully completing the study.

Sampling

Through the non-probability method, purposive sampling, a national sample of 100 participants was recruited. Qualtrics©^{xm} ensured the study would maintain 100 participants, which eliminated issues of low-response rates. Low response rates are a common concern when conducting survey research (Creswell, 2012).

Instrument

A researcher-developed online Qualtrics© survey was used to identify the digital technology skills important for entry-level employees perceived by employers in management in organizations in the U.S. Survey development was guided by best survey design practices according to Creswell (2012) and best survey research practices for online platforms by Litman and Robinson (2020). Using Creswell's (2012) and Litman and Robinson's (2020) guidance allowed the researcher to produce a reliable and valid instrument using 21st-century tools and services to their full potential.

Digital Literacy Competence Areas

The skill items used in the survey were adopted from the Digital Competence (DigComp 2.0) Conceptual Reference model (Vuorikari et al., 2016). All five competence areas identified in

the model: Information and data literacy, communication and collaboration, digital content creation, safety, and problem-solving, and 20 out of 21 skill subsets were used to assess the digital technology skills of employees with developmental disabilities as perceived by their employer (see Table 5).

A few modifications suggested by the researcher's dissertation chair were made under the first competence, Information and Data Literacy. One item (*Evaluating data, information, and digital content)* was omitted due to its ambiguity. That is, evaluating data, information, and digital content may not require digital technology skills and, therefore, could produce answers that do not measure the intended construct. A second item (*Managing data, information, and content)* was modified to read *Managing digital data, information, and content* to ensure it was only measuring the digital ability to manage digital materials. Another item (*Browsing, searching, filtering data, information, and digital content)* was separated into two separate items and modified to read *Browsing and searching digital content* and *Filtering digital data, information, and content*. Additionally, under the Digital Content competence area the *Integrating and re-elaborating digital content* subskill item was also separated into two items. The researcher revised the items to read *Integrating digital content* and reworded re-elaborating to *Editing digital content* for clarity and to distinguish each skill assessed.

Several skills under the Safety competence were also altered. The word *digital* was added to all safety skills to clarify to participants that all skills pertain to the protection of digital materials or behaviors in a digital environment. For example, the *Protecting devices* item was changed to *Protecting digital devices* and the *Protecting personal data and privacy subskill* was

changed to *Protecting personal digital data and privacy.* Of particular significance under the Safety competence area was the change to the last skill, *Protecting environments*. The researcher modified the item to read *Protecting the rights of those in digital environments.* Reframing the skill this way eliminates any confusion by clarifying that the skill focuses on one's ability to protect others' rights in digital environments (i.e., websites, social media outlets, and other web-based resources).

Table 5

Digital Literacy Competence Areas and Skill Subsets

Digital literacy competence area	Skill subsets
Digital information and data literacy	• Browsing and searching data, information, digital content • Filtering digital data, information, and content • Managing digital data, information, and content
Digital communication and collaboration	• Interacting through digital technologies • Sharing through digital technologies • Engaging in citizenship through digital technologies • Collaborating through digital technologies • Netiquette • Managing digital identity
Digital content creation	• Developing digital content • Integrating digital content • Editing digital content • Copyright licenses • Programming
Digital safety	• Protecting digital devices • Protecting personal digital data and privacy • Protecting digital health and well-being • Protecting the rights of others in digital environments

Digital problem-solving	• Solving technical problems • Identifying needs and technological responses • Creatively using digital technologies • Identifying digital competencies gaps

Survey Development

According to Creswell (2012), grouping questions according to content allows respondents to navigate the survey instrument with ease. In the current study, the researcher developed a survey consisting of four sections (prescreening questions, demographics questions, skills and competences, organizational training questions) with 35 questions with 23 subitems. The first group of questions began with a prescreening question. *Qualtrics*© recommends including screening questions to ensure respondents meet the study criteria. Prescreening questions were used to validate whether the respondent qualified to participate in the study. If their answer choice was not validated, the respondent was screened out of the survey. The second section included five demographic questions collecting data on the respondent's organization (e.g., geographical location, industry, company size) and their job title or role.

During the skills and competencies section of the survey, employers were introduced to the five competence areas and the corresponding subskills of the DigComp 2.0 Conceptual Reference Model (Vuorikari et al., 2016). Each competence area consisted of three items:

1. Are [competence area] skills important in entry-level employees at your organization?
2. These [competence area] skills are important in entry-level employees at my organization.

3. Rank these digital information and data literacy skills in order of importance in entry-level employees at your organization.

In Item 1, employers were asked to select between *No* or *Yes*. If *Yes* was selected, they were presented with Item 2. They were asked to rate the importance of the skill subsets of those competence areas on a 4-point Likert scale (4 = *Very Important*, 3 = *Important*, 2 = *Slightly Important*, and 1 = *Not Important at All*). If the skills were irrelevant to employees' job responsibilities at the entry level, respondents could select the *Not Applicable* option. Next, employers were asked to rate their agreement with Item 3 subsets on a 4-point scale (4 = *Strongly Agree*, 3 = *Agree*, 2 = *Disagree*, 1 = *Strongly Disagree*). A *Not Applicable* choice was also given for these subsets. Litman and Robinson (2020) recommend a 4-point scale with a *Not Applicable* option throughout all skill subset items.

Not all questions in a survey are applicable to all participants (Creswell, 2012). Therefore, if employers selected *No* to Item 1 in this section for any competence area, skip logic was applied, and questions pertaining to that competence area were not presented to the respondent. As a result, respondents were only asked items directly related to the digital technology skills relevant for entry-level employees at their organization. Using skip logic reduces the survey length and time for participants and eliminates irrelevant results during analysis (Litman & Robinson, 2020). The final section of the survey contained general questions about the respondents' organization to assess their organizational training practices and digital proficiency expectations for entry-level employees.

To avoid courtesy bias and eliminate ambivalence, many of the items in the survey included a 4-point Likert scale with no neutral point. There are debates among researchers regarding the optimal number of points in a Likert scale (Subedi, 2016). However, the General Self-Efficacy Exam (GSE), a 4-point Likert-scaled instrument used by Schwarzer (2002) in a sample from 23 nations, demonstrated internal consistency through Cronbach's alpha (.76-.90). Additionally, in a study conducted in the U.S. by Chang (1994) with a sample of 165 respondents comparing the internal consistency reliability of a 4-point and 6-point Likert-type scales, the researcher found that though the 6-point scale added more to the systematic method variance, the 4-point scale had higher reliability. This finding supports some researchers' claim that reliability is independent of the number of points in the scale (Boote, 1981;Lozano et al., 2008; Mattell & Jacoby, 1971).

Variables

The independent variable in the study was digital literacy in the form of the five digital literacy competence areas. The dependent variable was employers' perception of the importance of the digital literacy competence areas.

Research Procedure

The researcher complied with the ethical standards of the University of Central Florida (UCF). Online training courses designed to prepare researchers to conduct research were completed. Furthermore, before conducting the study, a detailed research application was submitted to the Institutional Review Board (IRB) committee at UCF, whereupon the researcher received approval from UCF's IRB (Appendix A).

Validation

To ensure the quality of the instrument, the survey was peer-reviewed by a panel of experts to gain feedback on structural aspects, content and item importance, simplicity, and understandability (Elangovan & Sundaravel, 2021). Two rounds of feedback were conducted. The first round consisted of feedback from several experts in both domain and subject matter from Think College, Virginia Commonwealth University' Center on Transition, the Division on Career Development and Transition, and Orange County Public Schools Special Education Transition School. Experts were asked to view the survey and give feedback on item relevancy, clarity, flow, and structural aspects. Then, the researcher discussed, compiled, and incorporated all feedback recommendations and proceeded to the second round of review, which consisted of the researcher's committee members. Two committee members reviewed a table of the recommendation and modification from round one and provided guidance on finalizing the validation of the instrument.

Soft Launch

Both Creswell (2012) and Litman and Robinson (2020) recommend conducting a pilot before launching a research survey. Therefore, before conducting the study, the researcher conducted a soft launch of the survey through Qualtrics© . That is, after the survey was amended and finalized, it was disseminated electronically to 15% of the sample quota ($N = 15$). Once participants were recruited, they received a link to the study directing them to the survey instrument. Before gaining access to the survey, respondents provided explicit informed consent. Therefore, participants only gained access to the survey items after selecting "Yes" to an online

consent form embedded in the survey. For example, only after respondents indicated they had read the study details, were 18 years or older, met the study criteria, understood their participation was voluntary, and selected "Yes" to participate, were they given access to survey items. Respondents were immediately screened out of the survey if they responded "No." Respondents who did not pass the prescreening question were also screened out of the survey.

Once the survey was submitted by respondents, the data were immediately accessible to the researcher and a Qualtrics© -assigned project manager, who monitored data collection during the launch. The survey link was discontinued after the sample quota (N= 15) was met and the data were reviewed by the project manager and researcher for data quality.

Reliability Testing

Test measurements must meet a certain standard to establish trustworthiness (Zijlmans et al., 2019). That is, reliability is central to test quality (e.g., AERA et al., 2014). Additionally, administering a well-tested instrument is best practice (Creswell, 2012). Therefore, the researcher tested the survey data for reliability to determine whether skill items correlated with and measured the intended constructs.

To examine the internal consistency of the construct validity, the researcher used IBM's Statistical Package for the Social Sciences (SPSS) software version 27 to compute Cronbach's alpha coefficient (Field, 2013). Cronbach's alpha measures the strength of an item's reliability. Reliability coefficients range from zero (no reliability) to 1.00 (perfect reliability). After computing the reliability and item statistics for all five constructs, the researcher used the output data to re-evaluate the items. Table 6 reflects the reliability test output data.

Items in the digital information and data literacy section had a Cronbach's alpha lower than .65 (.295). While this is low, the researcher was aware that alpha also depends on the number of items in a test (Cronbach, 1951), and that Cronbach's alpha could be low for this section of items and, therefore, chose not to remove any items but to improve the least correlating item. After reviewing the inter-item correlation matrix, the research was able to identify that the first item showed the least correlation among the other items. Therefore, the first item was modified to read *browsing and searching digital information and content*. Additionally, since "both very low and very high alpha values can go either with one-dimensionality or multidimensionality of the data" (Sijtsma, 2009, p. 119), the researcher tested the overall internal reliability of the five subskills scales which computed a satisfactory level of internal consistency (.936). The results are shown in Table 7.

Furthermore, after the Qualtrics© project manager made the survey link accessible to participants and the complete study commenced, the researcher retested the internal consistency of the digital information and data literacy items of the complete study data with a larger sample ($N = 100$). The results are also displayed in Table 7. As illustrated, with the larger representative sample, the items' reliability increased to .717 with all item statistics means being higher than 3.00; this may be because Cronbach's alpha cannot be considered a measure of a scale or instrument but only a measure of its application to a specific sample of respondents (Taber, 2018).

Table 6

Soft Launch Reliability Output

Variable	Reliability statistics		Item statistics		
	Cronbach's Alpha	# of items	*M*	*SD*	*N*
Information and data literacy	.295	3			
Q11_1			3.64	.505	11
Q11_2			3.27	.467	11
Q11_3			3.09	.701	11
Communication and collaboration	.835	6			
Q14_1			3.73	.647	11
Q14_2			3.09	.539	11
Q14_3			3.45	.820	11
Q14_4			3.09	.944	11
Q14_5			3.36	1.21	11
Q14_6			2.73	.786	11
Content creation	.718	5			
Q17_1			3.80	.422	10
Q17_2			3.20	.422	10
Q17_3			3.20	.789	10
Q17_4			3.40	.699	10
Q17_5			3.50	527	10
Safety	.690	4			
Q20_1			3.67	.651	12
Q20_2			3.00	.603	12
Q20_3			3.25	.866	12
Q20_4			3.17	.835	12
Problem-solving	.810	4			
Q23_1			3.75	.622	12
Q23_2			3.00	.603	12
Q23_3			3.25	.965	12

Variable	Reliability statistics		Item statistics		
	Cronbach's Alpha	# of items	M	*SD*	*N*
Q23_4			2.75	.866	12

Table 7

Comparison of Digital Information and Data Literacy Reliability Output

Data source	Reliability statistics	
	Cronbach's Alpha	*N*
Soft launch data		
Q11_1-3	.295	3
All five subskills	.936	22
Study data		
Q11_1-3	.717	3
All five subskills	.936	22

Data Collection

This research centered on U.S. employers' perception of the digital technology skills important for entry-level employees at their organization. The researcher collected data over two weeks for the qualitative portion of the study and until the sample quota was met for the quantitative portion. The researcher analyzed U.S. employers' views on the importance of digital technology skills in five critical areas of digital literacy for entry-level employees. The data included scale measurements reflecting employers' perceptions collected from an online survey. Data collection began in April 2023 via a secure Qualtrics©^{xm} survey link and concluded two weeks later with the deactivation of the survey link. The data collection process was monitored by the researcher and a project manager appointed by Qualtrics© . Additionally, the project manager reviewed and cleaned all data entries for any missing data or invalid submissions. No identifiable information was collected during the study.

Data Analysis

The data analysis for each research question varied based on the type of question and statistical analysis required. The survey responses were directly exported into SPSS software using Qualtrics© to perform statistical analysis. Once the data was imported into SPSS, a faculty member from the University of Central Florida's Computing and Statistical Technology Laboratory in Education (CASTLE) reviewed the data in SPSS for any inconsistencies before moving onto the data analysis process. As mentioned, the data collection tool consisted of four sections. Demographic information was gathered in Section 1 of the survey. The remaining survey sections included Likert-scale statements that were coded using weighted values for each answer option. Tables 8 and 9 display the Likert-scale answer choices and the numeric value

equivalents. The *No* or *Yes* items in Sections 3 and 4 were coded as "1" and "2," respectively, with "0" indicating "Not Applicable or "I do not know."

Table 8

Four-Point Likert Scale Response Choices: Measures of Importance

Response	Numeric equivalent
Not applicable	0
Not important at all	1
Slightly important	2
Important	3
Very important	4

Table 9

Four-Point Likert Scale Response Choices: Measures of Agreement

Response	Numeric equivalent
Not applicable	0
Strongly disagree	1
Disagree	2
Agree	3
Strongly agree	4

Descriptive Analysis

Descriptive analysis was conducted to summarize measures from the survey to produce percent comparisons and mean score analysis. Measures of frequency were used to highlight the

relationships or patterns among participants, such as their organization's geographic location, industry, size, and business sector (i.e., private or public), and their job titles. *No/Yes* answer choices were also analyzed using measures of frequency. Employers' responses to all other survey items containing a 4-point scale score were also analyzed using descriptive statistics. However, to understand the digital technology competence areas respondents perceived as important to their organization, the researcher employed measures of central tendency and measures of variation to analyze the digital technology skills addressed in the study's first research question and sub question.

Threats to Validity

Due to the nature of the survey design research, threats to validity were encountered, including sample selection and instrumentation. Sample characteristic was a significant threat to the validity of the current research study. Employing probability sampling strategies ensures this type of validity is not violated (Polit, 2013). However, a non-probability sampling strategy was used to recruit participants in the current study. Although the sampling technique is a non-probability strategy, the researcher did not have control over the units selected. Any person a part of Qualtrics©' market research panel could participate in the study if they met the study criteria, increasing the sample's representativeness. According to a survey by Heen et al. (2014) comparing different online sample approaches for generating national samples, online panels can represent a population similarly to traditional recruitment methods. Therefore, the researcher minimized this threat by using Qualtrics©' market research panel. Additionally, the researcher used descriptive analysis to provide the sample characteristics.

Another threat to the validity of this study was the use of a researcher-developed instrument. That is, the data were collected from a researcher-constructed online survey with multiple-choice and 4-point Likert-scale questions. Respondents were asked to self-report their perceptions. The instrument's scale, content, and design might have an impact on the accuracy of participants' responses. To address this potential threat, the researcher tested for the validity and reliability of the survey, which included two rounds of peer review, a soft launch of the survey, and testing for Cronbach's alpha of the survey items.

Qualitative Methodology

Classification of Content

Identifying the type of content that will be used for inquiry is an essential step in content analysis (Denzin & Lincoln, 1998). For this study, the researcher analyzed publicly accessible online content created by Think College, IPSE programs, or the sponsoring institution. Data sources included syllabi, sample schedules, course catalogues, and program descriptions, all of which are considered extant data; that is, electronic data that are accessible to the public to read, review, copy, or download (Salmons, 2017). This study included extant data called contemporary materials, documents created for online use and electronic access (Salmons, 2017).

Setting

Data collection was conducted online. Therefore, the setting for this study was qualitative e-research (Salmons, 2017). '"E-research" is a broad term for various online and internet-based approaches (Fielding et al., 2016).

Unit of Analysis

Purposive sampling was employed to select the unit of analysis for this inquiry (IPSE programs). To be included in the sample, programs must offer at least one course only for students within the IPSE program. The researcher set this criterion to ensure that the sample included programs that serve individuals with ID who would not traditionally attend a higher education institution. Currently, there are 317 postsecondary programs in the U.S. After filtering the college search on the Think College website, 148 programs were found to meet criteria. The researcher input all 148 programs into an Excel spreadsheet and randomized the sample. According to Krippendorff (2018), the sample size in content analysis should be determined based on the need for information so the research question can be answered with sufficient reliability. Over 50% of the IPSE programs that met criterion were included in data collection (N = 83). Using purposive sampling allowed the researcher to obtain a population that shared specific characteristics (Creswell & Poth, 2018), such as the unique criteria stipulated in the current study. Table 10 displays the IPSE programs' demographics.

Table 10

IPSE Programs' Demographics

Program characteristics	*N*	%
Region		
Northeast	23	27.71%
Southeast	24	28.92%
Midwest	13	15.66%
Southwest	16	19.28%
West	7	8.43%
Program length		
>12 months	8	7.92%
2 years	37	36.63%
3 years	12	11.88%

Program characteristics	*N*	%
4 years	21	20.79%
Varies from student to student	23	22.77%
Percentage of academic inclusion		
0%	23	27.71%
1-24%	17	20.48%
25-49%	6	7.23%
50-74%	21	25.30%
75-99%	16	19.28%

Instrument

Instruments that derive meaning and uncover underlying issues are most effective for qualitative research (Merriam & Tisdell, 2016). Therefore, the researcher was the best instrument for the current study (Creswell, 2014). The researcher served as the primary instrument during the qualitative data collection portion of the study. As a result, I must acknowledge my role as an instrument and disclose my positionality.

As a first-generation African American female academic, I empathize and sympathize with the challenges of marginalization and discrimination many individuals with significant disabilities face in society. Unfortunately, systematic bias and exclusion rooted in ablism are the common denominators for these shared experiences (Aronson & Boveda, 2017; Scott et al., 2022). Additionally, as a former K-12 educator of students with ID and current adjunct professor of an IPSE program at a large university, I understand the importance and champion the efforts to prepare individuals with ID with the necessary skills to be successful in the workforce. My knowledge and experiences in this capacity influence what I bring to this research. As the primary researcher in this study, my role was to identify the meaning of the content collected

judiciously. I employed member checks and incorporated critical subjectivity to ensure my own experience did not influence any part of the study.

Data Collection

The researcher used Appendix D to guide the data collection for Research Question 2. The researcher used Think College's College Search tool to gather general information of the program and gain access to each IPSE program's website. Using the data collect guide, Appendix D, the researcher used the General and Requirements sections provided on Think College to collect IPSE programs' demographic information. The researcher also collected data from the Academic section if it related to course requirements, course selections, and credential and certifications pertaining to digital technology. Next, the researcher proceeded to the IPSE program's website where the content on each webpage of the site was reviewed for sample schedules, course catalogues, course syllabi, and any information or descriptions of course offerings. When documents were available for download, they were saved, renamed under the program's sample number and the content type (3_SampleSchedule), and stored in a folder. When documents were not downloadable, they were screenshot, renamed, and stored. All content on the website containing computer and technology terminology, for example, terms such as *computer science, Microsoft©, technology workshop*, and so on, was recorded using Appendix D. If any content was ambiguous, the researcher contacted an administrator of the program for clarification via email. Those emails were also screenshot, renamed, and stored for coding. The emails were reviewed for additional information and details on the programs' digital literacy preparation and coded using the researcher-developed coding guide [APPENDIX E].

Data Analysis

The researcher used a qualitative content analysis approach to explore publicly available information provided by Think College and IPSE programs. Specifically, the researcher aimed to determine the presence of digital literacies and digital technology preparation within IPSE programs by analyzing online data sources. According to Krippendorff (2018), content analysis is "a research technique for making replicable and valid inferences from text" (p. 24). Content analysis was the primary approach used for this inquiry. Selecting an approach that supported the researcher in identifying the meaning of electronic text data was essential. Content analysis provided that framework, therefore making the technique an appropriate qualitative approach to address Research Question 2.

Data analysis occurred during data collection and the writing of the findings (Creswell, 2014). The researcher thoroughly analyzed the data by focusing on both the language and the contextual meaning of the data (Bengstsson, 2016). As a technique, content analysis involves specialized procedures (Krippendorff, 2018). Research Question 2 was analyzed using a directed content analysis approach. Direct content analysis aims to conceptualize, validate, or extend a theoretical framework or theory (Hsieh & Shannon, 2005). Since existing theory or research focuses the research question, the key variables used to analyze Research Question 2 were drawn from the conceptual framework of this study, the DigComp 2.0 Conceptual Reference model (Vuorikari et al., 2016). First, the researcher identified the five competence areas as the key variables for initial coding categories (Potter & Levine-Donnerstein, 1999). Next, operational definitions for each of the competence areas were determined using their subskills. A coding guide developed using the conceptual reference model may be found in APPENDIX E for

Research Question 2. The coding guide provides an overview of how the researcher evaluated each skill or preparation for categorization into one of the digital literacy competence areas.

Trustworthiness

The data were validated through member checking, a method used to establish credibility and trustworthiness (Shenton, 2004). Specifically, *trustworthiness* was addressed by use of the following procedures. Dependability was addressed through peer review. Peer reviewers and members of the researcher's dissertation committee reviewed the research plan implementation assisted in ensuring dependability. *Confirmability* was addressed by maintaining a detailed description of the data collection and analysis processes. Such audit trails allow researchers to adhere to the data collection procedures and decision-making throughout the study (Shenton, 2004). Finally, *transferability* was addressed through the researcher's dissertation committee, who helped select and implement appropriate data collection and analysis techniques. Additionally, committee members checked for any biases or personal influences on the data. Furthermore, peer reviewers, who were not part of the study or the committee, verified the applicability of the study's findings.

Limitations and Delimitations

The use of extant data as a source of data analysis embodies certain limitations. In extant analysis, considering the creator's intent when developing documents and content is necessary (Salmons, 2017). Since electronic data sources and documents are typically developed for organizational purposes rather than research, this type of data may be a limitation of this study. Additionally, when collecting extant data, researchers usually cannot ask questions to better understand the motives, background, and relationships of the content creator or user (Salmons,

2017). To address these limitations, during the data collection and analysis process, the researcher contacted IPSE program staff when further clarification on any data was required to ensure reliability.

Summary

This chapter discussed the methods and procedures used to gain insight into U.S. employers' perceptions of the importance of digital literacy skills in the workforce and digital technology preparation in IPSE programs for individuals with ID. This mixed-methods research study utilized quantitative methods to analyze the responses collected from 100 U.S employers in administrative positions. Qualitative methods were applied to assess IPSE programs' coursework content for digital technology preparation. The study's research questions, selection of participants and population, instrumentations, data collection, and data analysis were also presented. Chapter Four presents the results obtained from data collection.

CHAPTER FOUR: RESULTS

Technology is fast becoming a key tool in the workplace and, as a result, digital skills are increasingly in demand in many industries (Becker et al., 2017). The purpose of this study was to identify the digital technology skills important in the 21st-century workforce and assess the digital technology preparation provided in Inclusive Postsecondary Education (IPSE) programs for students with intellectual disabilities (ID). The problem this study addressed is the lack of research on equipping individuals with ID with 21st-century employability skills such as digital literacies. The study gives stakeholders insight into the digital technology skills in demand in the workforce and a baseline on the prevalence of digital technology preparation in IPSE programs. This chapter presents the quantitative results from the electronic survey and the qualitative results from the content analysis used to conduct the study.

Section One: Data Analysis for Research Question 1

Research Question 1: Which digital technology skills of digital literacy do U.S. employers consider important for entry-level employees at their organization? Eleven questions and 45 survey items were analyzed to address this question. All respondents were asked whether each digital literacy competence area was an important skill for entry-level employees at their organization. As shown in Table 11, more than 80% of the sample perceived each competence area to be an important skill for entry-level employees at their organization, with digital safety (90%) being the skill most frequently selected.

To provide more context to U.S. employers' perceptions, they were asked to rank each of the five digital literacy competence areas from most to least important to reflect the hierarchy of importance of these skills in their organization. Descriptive analysis was used to reveal U.S.

employers' rankings, as displayed in Table 12. The order of importance of all five competencies was as follows: (1) Digital information and data literacy, (3) digital communication and collaboration, (4) digital safety, and (5) digital content creation and digital problem-solving.

If employers perceived a competence area as being important, they were then asked to provide the degree of the importance of its subskills in entry-level employees. Mean scores and standard deviations for each subskill item were computed and are displayed in Table 13. These survey items used a 4-point Likert-style response scale calibrated as follows: 1 = *not at all important*, 2 = *slightly important*, 3 = *important*, and 4 = *very important*. The data showed U.S. employers found all subskills in digital information and data and digital safety competence areas to be *very important* (3.26-4.00) for entry-level employees. In addition, employers reported interacting through digital technologies and collaborating through digital technologies as being *very important* and all other digital communication and collaboration subskills as *important* (2.60-3.25). Only one subskill in the digital content creation competence areas was rated as *very important*, developing digital content. All other subskills, including programming, were rated as *important*. Lastly, employers rated solving technical problems and identifying digital competencies gaps as *very important* skills above identifying needs and technological responses and creatively using digital technologies, which were rated as *important*.

To further explore employers' perception of the important of the digital literacy subskills, respondents were asked to rank the subskills in order of importance for entry-level employees. The results are presented in Table 14.

Subskills in digital information and data literacy ranked in importance as follows:

(1) Managing digital data, information, and content,

(2) Filtering digital data, information, and content,

(3) Browsing and searching digital content.

Subskills in digital communication and collaboration were ranked in the following order:

(1) Interacting through digital technologies,

(2) Sharing through digital technologies,

(3) Engaging in citizenship through digital technologies,

(4) Collaborating through digital technologies,

(5) Netiquette, and

(6) Managing digital identity.

The digital content creation subskills items were ranked in the following order:

(1) Developing digital content,

(2) Integrating digital content,

(3) Editing digital content,

(4) Copyright licenses, and

(5) Programming.

Ninety percent of the sample found digital safety important at their organization and ranked its subskills in the following order:

(1) Protecting digital devices,

(2) Protecting personal digital data and privacy, and

(4) Protecting digital health and well-being and protecting the rights of others in digital

environments.

Lastly, subskills for digital problem-solving were ranked in the following order:

(1) Solving technical problems,

(2) identifying needs and technological responses, and

(4) creatively using digital technologies and identifying digital competencies gaps.

Table 11

Percentage of Employers Reporting of Each Digital Literacy Skill's Importance for Entry-Level Employees at Their Organization

		No	Yes
DigComp 2.0 competence area	*N*	%	%
Digital information and data literacy	100	14%	86%
Digital communication and collaboration	100	14%	86%
Digital content creation	100	13%	87%
Digital safety	100	10%	90%
Digital problem-solving	100	17%	83%

Table 12

Rankings of Each Digital Literacy Competence Area's Level of Importance in Entry-Level Employees

			1	2	3	4	5
#	DigComp 2.0 competence areas	*N*	%	%	%	%	%
1	Digital information and data literacy	100	35%	28%	24%	5%	8%
2	Digital communication and collaboration	100	19%	25%	27%	20%	9%
3	Digital content creation	100	13%	14%	21%	25%	27%
4	Digital safety	100	25%	20%	13%	29%	13%
5	Digital problem-solving	100	8%	13%	15%	21%	43%

Table 13

Level of Importance of Each Digital Literacy Competence Area's Subskills in Entry-Level Employees

DigComp 2.0 subskills	*N*	*M*	*SD*
Digital information and data literacy			
Browsing and searching digital content	85	3.99	1.33
Filtering digital data, information, and content	86	3.70	1.40
Managing digital data, information, and content	86	3.86	1.42
Digital communication and collaboration			
Interacting through digital technologies	86	3.48	.76
Sharing through digital technologies	86	3.15	.81
Engaging in citizenship through digital technologies	86	3.08	1.01
Collaborating through digital technologies	86	3.30	.87
Netiquette	86	3.10	1.01
Managing digital identity	86	3.16	.94
Digital content creation			
Developing digital content	86	3.36	.77
Integrating digital content	85	3.25	.75
Editing digital content	82	3.13	.79
Copyright licenses	79	3.16	.89
Programming	84	3.19	.83
Digital safety			
Protecting digital devices	89	3.51	.68
Protecting personal digital data and privacy	89	3.45	.64
Protecting digital health and well-being	88	3.27	.78
Protecting the rights of others in digital environments	87	3.28	.69
Digital problem-solving			
Solving technical problems	83	3.52	.77
Identifying needs and technological responses	82	3.23	.72
Creatively using digital technologies	82	3.21	.77
Identifying digital competencies gaps	83	3.26	.73

Table 14

Rankings of Each Digital Literacy Competence Area's Subskills

#	DigComp 2.0 subskills	*N*	1 (%)	2 (%)	3 (%)	4 (%)	5 (%)	6 (%)
	Digital information and data literacy							
1	Browsing and searching digital content	86	36.0%	25.58%	38.37%			
2	Filtering digital data, information, and content	86	29.0%	44.19%	26.74%			
3	Managing digital data, information, and content	86	34.8%	30.23%	34.88%			
	Digital communication and collaboration							
1	Interacting through digital technologies	86	40.7%	17.44%	18.60%	11.63%	5.81%	5.81%
2	Sharing through digital technologies	86	17.4%	31.40%	17.44%	13.95%	13.95%	5.81%
3	Engaging in citizenship through digital technologies	86	10.4%	23.26%	24.42%	16.28%	13.95%	11.63%
4	Collaborating through digital technologies	86	12.7%	11.63%	17.44%	30.23%	19.77%	8.14%
5	Netiquette	86	8.14%	10.47%	8.14%	11.63%	34.88%	26.74%
6	Managing digital identity	86	10.4%	5.81%	13.95%	16.28%	11.63%	41.86%
	Digital content creation							
1	Developing digital content	87	44.8%	19.54%	17.24%	10.34%	8.05%	
2	Integrating digital content	87	16.0%	28.74%	27.59%	18.39%	9.20%	
3	Editing digital content	87	9.20%	26.44%	36.78%	12.64%	14.94%	
4	Copyright licenses	87	17.2%	12.63%	13.79%	36.78%	19.54%	
5	Programming	87	12.6%	12.64%	4.60%	21.84%	48.28%	
	Digital safety							
1	Protecting digital devices	90	38.8%	26.67%	24.44%	10.00%		
2	Protecting personal digital data and privacy	90	31.1%	36.67%	22.22%	10.00%		
3	Protecting digital health and well-being	90	13.3%	24.44%	27.78%	34.44%		
4	Protecting the rights of others in digital environments	90	16.6%	12.22%	25.56%	45.56%		
	Digital problem-solving							
1	Solving technical problems	83	32.5%	25.30%	28.92%	13.25%		
2	Identifying needs and technological responses	83	27.7%	40.96%	21.69%	9.64%		
3	Creatively using digital technologies	83	20.4%	15.66%	28.92%	34.94%		

#	DigComp 2.0 subskills	N	1 (%)	2 (%)	3 (%)	4 (%)	5 (%)	6 (%)
4	Identifying digital competencies gaps	83	19.2%	18.07%	20.48%	42.17%		

Section Two: Data Analysis for Research Question 2

Research Question 2: What digital technology preparation is available to individuals with intellectual disabilities attending an Inclusive Postsecondary Education (IPSE) program in the U.S.? Responses to this question were examined by means of content analysis. The key variables used in the directed content analysis approach to analyze RQ2 were the five digital literacy competence areas of the DigComp 2.0 Conceptual Reference model (Vuorikari et al., 2016). Research Question 2 concerns the availability of digital technology preparation in the participating 83 IPSE programs. The availability of various digital technology skill preparation in IPSE programs specifically offered to individuals with ID is shown in Table 15.

Through the content analysis of IPSE programs' online content, a total of 44 skills and courses were coded. Across data sources, the most reoccurring digital skill preparation involved "basic computer skills" and "computer applications." Data sources described courses including "basic computer skills" and "computer applications" preparation, to incorporate Microsoft© and Google applications, emailing, and digital citizenship components. The competence areas for which least preparation was found within the 83 IPSE programs were digital safety (7.23%) and digital problem-solving (7.23%).

While some programs offered preparation in a range of digital technology skills covering various digital literacy subskills integrated into specialized courses for individuals with ID, only three offered digital literacy as a course or curriculum. Furthermore, over half (51%) of IPSE programs sampled did not have content discussing any digital technology skills preparation.

Table 15

Digital Technology Skills Preparation at IPSE Programs

Type of preparation	# of programs offering the preparation
Basic computer skills	5
Computer applications	5
Computer skills for the workforce	3
Digital literacy	3
Digital media/multimedia	3
Technology workshop	3
Computer science	3
Introduction to computers	2
Computer literacy	2
Computer & information technology	2
Information technology	2
Introduction to computing principles	2
Computer coding	2
STEAM	2
Microsoft© office certifications	2
Introduction to computer design	2
Web development	1

Research Question 2 also assessed whether the digital technology skills in demand in the U.S. workforce were included in the digital skills preparation available at the 83 IPSE programs sampled. To analyze this relationship, the data from RQ1 served as categories used to analyze the digital skills discovered in RQ2. Table 16 displays the number and percentage of IPSE programs offering preparation in each of digital technology skills competence area. As illustrated, the categories with the highest percentage of digital skills preparation were communication and collaboration (41%) and information and data literacy (40%). Programs providing preparation in skill such as digital citizenship, emailing, editing documents, sharing online documents, participating in group forums and chats, using job platforms to apply for jobs

and identifying appropriate digital communication tools and services, and so on, were coded as communication and collaboration skills. The information and data literacy category includes programs that offer preparation in organizing digital data and information, understanding search engines, key words, and reliable data sources, and so on.

Table 16

IPSE Program Digital Technology Skills Preparation by Digital Literacy Competence Area

The five digital competence areas of digital literacy	Information and data literacy	Communication and collaboration	Content creation	Safety	Problem-solving	Digital literacy
Number of IPSE (out of 83)	33	34	19	6	6	3
Percentage	39.76%	40.96%	22.89%	7.23%	7.23%	3.61%

Summary

Descriptive statistics and content analysis procedures were used to analyze the results of the two research questions underlying this study. Briefly, in response to RQ1, employers ranked digital information and data literacy and digital communication and collaboration as the top digital literacy skills for entry-level employees at their organizations. Further, all three digital information and data literacy items were deemed very important, supporting its top-ranking competency of digital literacy. In response to RQ2 with regard to digital technology skills preparation available to individuals with intellectual disabilities enrolled in IPSE programs, the skills most frequently offered were digital information and data literacy and digital communication and collaboration skills, such as basic computer and application skills.

Based on these analyses, in Chapter Five the researcher will summarize the findings and present a discussion, implications, and recommendations for future research.

CHAPTER FIVE: DISCUSSION

This study explored the digital technology skills important for entry-level employees in the 21st-century workforce and the digital technology preparation in inclusive postsecondary education (IPSE) programs for persons with intellectual disability (ID). This chapter has been organized to present a summary of the study, a discussion of the findings, and implications for practice based on the study's results. The chapter ends with recommendations for future research and a final conclusion.

Summary of the Study

The purpose of this study was to evaluate whether IPSE programs are equipping individuals with ID with the digital technology skills employers require in today's workforce. First, the researcher identified the digital technology skills important for entry-level employees in the 21st century by surveying 100 U.S. employers and then examined the curricula of IPSE programs to determine whether they are preparing individuals with ID with the digital skills leading to job market competitiveness. As such, the study establishes critical digital technology skills in demand in various industries in the U.S. and provides a platform for further research and discussion about the preparation in digital technology of individuals with ID at IPSE to ensure competitiveness in today's high-tech job market.

Individuals with disabilities are less likely to receive sufficient preparation in digital technology than their nondisabled peers (Tyson, 2015). Therefore, this study examined the availability of essential digital skill preparation to individuals with ID enrolled in IPSE programs. Without digital technology skills, persons with disabilities are disadvantaged in many areas. This potential disparity in the workforce is especially relevant in the 21st century, when

digital technology is essential for communication, education, and employment (Henderson & Tilley, 2018; Swinton & Williams, 2018).

Using the Digital Competence (DigComp 2.0) Conceptual Reference model (Vuorikari et al., 2016) to guide and frame the study, the researcher used mixed-methods methodology. The overarching research question for the study was: Are IPSE programs for individuals with ID preparing students with the digital technology skills employers deem important in the 21st century? The study was guided by the following research questions:

1. Which digital technology skills of digital literacy do U.S. employers consider important for entry-level employees at their organization?
    a. How do U.S. employers rank the digital technology subskills of digital literacy?
2. What digital technology preparation is available to individuals with ID attending an IPSE program in the U.S.?
    a. Which digital technology skills identified as important for entry-level employees by U.S employers are included in the digital technology preparation of individuals with ID in an IPSE program in the U.S?

Discussion of Findings

Research Question 1

Through the first research question, the researcher sought to identify the digital technology skills important in today's U.S. workforce. While most participating U.S. employers (90%) agreed that digital safety was an important skill in entry-level employees at their organization, when asked to rank each of the five digital literacy skills in order of importance, digital safety ranked fourth. The most important competencies chosen by the sample were

digital information and data literacy, followed by digital communication and collaboration. In terms of digital literacy subskills, the mean scores of respondents at organizations that required the digital literacy skill set showed that all subskills under each competence areas were *important* or *very important*. However, mean scores for all subskills for digital information and data literacy and digital safety fell into the *very important range* (3.26-4.00).

These findings are significant because, according to research conducted by the Institute for the Future and Dell Technologies (2017), increasing the competitiveness of individuals with disabilities in a constantly evolving workforce requires reskilling and upskilling with 21st-century skills. Insight into the digital technology skills employers perceive as important, as gathered in this study, is the first step to accomplishing those efforts.

Research Question 2

Based on the publicly available information, IPSE programs were found to provide preparation in various digital technology skills, such as basic computer skills, digital media/multimedia, computer & information technology, computer design, and web development. Data showed that 42 out of the 83 IPSE programs sampled (51%) did not have content discussing any digital technology skills preparation. However, 72% of the programs offered individuals with ID the opportunity to enroll in courses with the general population. Therefore, students may have engaged in other classes and activities in which some of these digital literacy skills may be acquired. Nonetheless, only three programs (4%) offered a digital literacy course or certification/badge taught with a curriculum centering on digital technology skill acquisition. While implementing stand-alone curricula such as Microsoft© Digital Literacy curriculum,

NorthStar Digital literacy, and Decoda Literacy Solutions is not the only way to develop students' digital technology skills, explicit instruction in this area is critical for mastery for individuals with ID (Cihak et al., 2015a, 201b).

After coding all 44 digital technology skills according to the DigComp 2.0 Conceptual Reference model, the digital literacy competencies most available at the 83 IPSE programs were found to be digital information and data literacy skills, followed by digital communication and collaboration skills. The most common digital skill preparation offered throughout the sample were basic computer and application skills. However, preparation for these skills was often introductory, covering such skills as email, conducting a job search, creating an account on various platforms, navigating job search platforms, and using various Microsoft© Office and Google applications. However, though the digital literacy competence area employers deemed most important and the digital literacy preparation offered at IPSE aligned, there needs to be more alignment in the subskills. Subskills determine individuals' competence in the competence area.

Consequently, the same mismatch is seen in the literature. In two studies, Collet et al. (2015) and Damoah and colleagues (2020) uncovered the same challenge for employers and college graduates in the job market: the mismatches between the skills employers' desire and the skills college applicants possess. Lyons et al. (2019) also showed this to be true regarding the increased demand for digital skills in the workforce and the unpreparedness in digital technology by entry-level employees. A mismatch in the skills individuals entering the workforce possess

and the skills in demand in the workforce is detrimental to both parties and further exacerbates the current U.S. hiring crisis.

Furthermore, six IPSE programs (7%) included digital safety skills preparation, however, employers indicated digital safety as a very important competence area amongst all five categories. This misalignment is most significant due to its broader impact on individuals with ID. Persons with ID are often met with a perception of risk for engaging online (Chadwick et al., 2017). Some risk includes being bullied online, being susceptible to online scams, and disclosing information that should be private. For that reason, providing digital safety education to individuals with ID in K-21 is critical. Digital safety education will assist persons with ID in learning the skills necessary to manage risk in digital environments and protect their digital identity, leading to increased digital inclusion and socialization (Chadwick, 2019).

Similarly, digital problem-solving (7.23%) was also found to be one of the competence areas in IPSE programs' data sources with the least preparation. This finding is of great interest due to the challenges individuals with ID have traditionally encountered in developing problem-solving skills (Wehmeyer & Shogren, 2016). Identifying problems and possible solutions are essential soft skills for the workforce. According to research, systematic problem-solving strategies (Cote et al., 2010) such as cognitive strategy instruction (Krawec et al., 2012) and schema-based instruction (Cook et al., 2019; Fuchs et al., 2020) are effective in teaching students with learning disabilities problem-solving in various domains. If IPSE programs included digital problem-solving in students' preparation, it would provide the population with increased opportunities to learn and master problem-solving and apply them in their work-based learning.

The existing literature shows that basic digital technology skills such as emailing are most frequently taught to students with ID (Cihak, 2015a, 2015b), findings that are corroborated by the current study. Therefore, although the digital literacy competence areas employers perceive most important in the workforce align with those addressed at IPSE programs, more alignment is necessary for in the subskills employers deem essential and the digital technology skills individuals with ID are prepared in at IPSE programs. This disconnect further perpetuates the digital skill gap between those with and without disabilities, and yet, how these skills are mastered by person with ID are not completely understood or researched at this time. To accurately prepare individuals with ID in the digital technology skills important in the workforce, IPSE programs should provide digital literacy education that covers more than basic digital technology skills while ensuring mastery of skills that may be difficult for persons with this type of disability to achieve based upon the criteria for diagnosis and inclusion related to IDEA.

Implications for Practice

This section presents implications for practice for practitioners, transition and workforce development specialists, and IPSE program faculty and staff. Based on the results of this study, digital literacy is a skill employers consider important for entry-level employees. However, IPSE programs only offered limited preparation in this area. Therefore, the researcher suggests that IPSE programs preparing persons with ID for competitive employment integrate digital literacy education to a level of mastery of essential skills into their curricula. Embedding employability skills into the curriculum will prepare students for success regardless of career interest (Hollister et al., 2017). For example, to address the lack of digital safety preparation, IPSE programs can collaborate with their host institutions' IT department to develop a module covering all the

digital safety subskills. Also, embedding different subskills within lessons across units that are already part of the syllabus is a great way to cover digital literacies comprehensively without drastically altering the course syllabus.

Closing the gap between education and employment leads to significant "digital income" for disadvantaged populations (Bolstad et al., 2012; Chetty et al., 2017). To that end, ensuring curricula align with industries' digital technology expectations for employees helps better prepare individuals with ID to enter the workforce with the required skills (Hollister et al., 2017). Without targeted measures to meet the needs of individuals with ID, the skills gap will continue to increase given today's rapid technological advancements.

Guided by the results of this study, the researcher presents the following recommendations:

- **Teacher preparation and professional development.** Teachers need to be prepared to foster 21st-century learners. Educators' competence and self-efficacy in teaching digital technology impact students' digital literacy proficiency (Dogan & Robin, 2008; Falloon, 2020). Updating teachers' competence profiles for 21st-century skills is critical to improving the academic and employment outcomes of students with disabilities (Caena & Redecker, 2019). Ensuring all educators have access to digital technology education throughout their pre- and in-service preparation will aid in creating educators competent in digital technology, directly impacting students' outcomes (Engen & Engen, 2019). Teachers need to enter the teaching field with digital competence and high self-efficacy in teaching digital technology. Falloon (2020) proposed a digital competence framework

for educators to model the planning and teaching of the competencies required to facilitate productive, safe, and ethical activities in diverse and digital environments for future teachers. Further, the framework used in this research has a corresponding curriculum for educators. That is, the European Framework for the Digital Competence of Educators or DigCompEdu (Redecker, 2017) supports the development of educator-specific digital competence. DigCompEdu is an effective tool for educators from P-21 to adult education, including vocational education, special education, and nonformal learning contexts.

- **IPSE programs administrators, coordinators, and educators' development.** In 2021, Think College's National Coordinating Center (NCC) published updated model accreditation standards for higher education programs for students with ID (Think College National Coordinating Center Accreditation Workgroup, 2021). The accreditation standards are recommended model criteria, standards, and components for IPSE programs for individuals with ID. NCC presented seven standards for faculty and staff. One of those standards states, "Staff and other professionals that work directly for the program have education and training commensurate with their roles and responsibilities and participate in ongoing professional development and training. (Think College National Coordinating Center Accreditation Workgroup, 2021**,** p3)." Similarly to educators, IPSE program faculty and staff should undergo development and training in practices, strategies, and curricula essential to educating their student population with 21st -

century digital technology skills. The IPSE programs can invest in memberships and partnerships with organizations such as the International Society for Technology in Education (ISTE), the Center for Applied Special Technology (CAST), Council for Exceptional Children's Innovation in Special Education Technology Division (ISET) and Division for Career Development and Transition, (DCDT), and the American Association on Intellectual and Developmental Disabilities (AAIDD) to gain access to valuable information and personnel preparation in disability and digital technology skills. Additionally, IPSE programs can consider partnering with departments or colleges within their host institution to receive free resources and preparation for their staff in these focus areas.

- **NCC's Curriculum Standards.** Within the model accreditation standards for higher education students with ID, NCC also recommended seven standards targeting IPSE programs' curriculum. Specifically, curriculum standard number five states, " The inclusive program of study includes instruction, internships, apprenticeships or other work-based learning, and other career development activities necessary to enable students to achieve and sustain competitive integrated employment (CIE) aligned with person-centered goals (Think College National Coordinating Center Accreditation Workgroup, 2021, p. 3)." Out of the 100 management employers surveyed, 71 % reported offering CIE for individuals with a disability. This data, along with the high percentages of employers reporting the importance of digital technology skills for entry-level

employees, suggest digital literacy education is necessary in IPSEs' programs of study. Digital literacy education's potential impact on persons with ID obtaining and sustaining CIE in today's workforce is significant enough to become a programmatic element in IPSE programs' career preparation curriculum.

    - **Curriculum evaluation.** An essential starting point to providing individuals with ID digital literacy education is examining the content of the given program's curriculum aligned with the targeted strengths and deficits of this population to determine whether digital literacy education is sufficiently addressed and in what areas digital technology education can be integrated if the skills are unaddressed (Hollister et al., 2017). The IPSE faculty and staff can evaluate programs' curriculum using similar producers employed in this study.

- **Digital literacy assessment.** Assessing students' digital literacy provides IPSE staff with valuable information that can inform learning and instruction (Laanpere, 2019; Lowenthal et al., 2023). Having insight into students' proficiency in each digital literacy competence areas will aid educators in developing personalized plans for students to target every subskill. Identifying potential gaps and struggles for students in this population in general could allow for national research focused on ways to teach skills with higher order and problem-solving skills in technology.
- **Sector partnerships**. The IPSE programs should partner with local companies to identify the digital skills gap and subsequently prepare highly skilled graduates in digital technology (Alexander et al., 2017). Identifying the digital literacy competence required

in the industries of students' interest will provide programs with valuable information for career planning. For example, Central Florida is known for its tourism, which creates a demand for employees in the hospitality industry. The University of Central Florida's (UCF) IPSE program offers students a hospitality track certification. The IPSE program staff can partner with organizations such as Rosen Hotels, Universal Studios, and Darden Restaurants to assess their digital technology proficiency requirements and embed these skills into the hospitality program track coursework. In doing this, employers can be confident that students graduating with the hospitality certification obtain the digital skills desired for employment at their organization. Furthermore, in the future ,UCF's IPSE program staff can consider working with these partners to establish an endorsement of their digital workforce training curriculum for hospitality.

The current study showed that 21% of the employees sampled worked at an organization that did not offer customized training for individuals with disabilities, and 17% did not offer any digital technology training, even if the skills were required for employment. Therefore, IPSE programs partnering with organizations in the community to develop modified training and training materials for individuals with ID would be advantageous for both parties. For example, the IPSE programs will gain insight into the needs and expectations of local businesses that can inform their practices and preparation, and the organizations will gain disability awareness and inclusion training in working with professionals knowledgeable about the population. Sector partnerships that

establishes collaborative efforts such as these are critical for the social inclusion of individuals with ID and increases the populations' employment outcome (Raja, 2016).

Resources for Practice

The guiding framework for this study, the Digital Competence (DigComp 2.0) Conceptual reference model was developed as a tool to aid in the successful implementation and incorporation of many of these recommendations (Pérez-Escoda & Fernández-Villavicencio, 2016; Vuorikari et al., 2016). DigComp 2.0 has been used internationally to strengthen digital literacy. As one of the most comprehensive frameworks for digital literacy, this practical tool provides common understanding and language used to assess individuals' current level of digital competence and identify the areas in which they need to improve. Furthermore, the framework consists of examples of knowledge, skills, and attitudes for each of the five digital literacy competence areas and an assessment of digital literacy competence to adequately prepare individuals to use digital technologies effectively. More importantly, all the DigComp 2.0 resources are free and accessible. The structure this framework offers IPSE programs in evaluating curriculum, assessing students' digital competency, and closing the digital technology skill gap is significant and could have a great impact on the way individuals with disabilities are prepared in 21st-centruy digital literacy.

For example, as an adjunct professor at an IPSE program, the researcher used the DigComp 2.0 framework and resources to embed digital literacy education into an upper-level career planning course specifically for students with ID in the program. The researcher took the pre-existing course syllabus and evaluated what digital literacy subskills were already addressed and

whether additional preparations could be included. For example, one of the final projects for the course was a digital portfolio that students could share with employers to showcase their experience and development in the program. The researcher used this unit to explicitly teach students digital information and data literacy and digital content creation subskills. Other subskills were addressed in the same manner.

Within the first two weeks of the semester, students were given the DigComp Digital Skills Assessment tool as a pre-test to evaluate students' digital literacy competence in each of the five areas. The assessment results were then used to scaffold lessons and input additional supports that may be needed for students. For example, for competence areas where students received a "foundation" level evaluation, extra resources such as video tutorials and visuals were available for students to review before the lesson. Additionally, task analysis charts were created to help students walk through certain activities' steps. Some lessons were extended for extra rehearsal before moving on to a new or compounding skill. Also, at the end of each class students engaged in a class discussion centering how each digital skill could be used at their internship or in a future career. The researcher implemented this "exit ticket" activity to help students understand how the digital skills they acquired could generalize from one environment to another.

During final exams, students were again given the DigComp Digital Skills Assessment tool as a post-test. The pre and posttests were compared to assess students' progress in each competence area. The researcher also performed one-on-one interviews with students to assess their perception of their growth and competence in digital literacy and the teachers' instruction. The data results were analyzed to improve learning and instruction for future course sections.

Three things IPSE Programs can do to Promote Digital Literacy for the Workforce

Promoting digital literacy is essential in today's technologically advanced workforce. The IPSE programs can play a pivotal role in promoting digital literacy and equipping persons with ID with the skills to navigate the digital world effectively and responsibly. Presented below are three things IPSE programs can implement to foster digital literacy among individuals with ID:

1. **Job carving.** Once students' digital competence is assessed and their strengths are identified. A helpful strategy for marketing students' digital employability skills is job carving. Job carving is a process where customized job roles are broken down into tasks, responsibilities, and functions to suit individuals with ID unique abilities and skills (Wehman et al., 2021). Job carving involves tailoring employment opportunities to accommodate individuals' specific strengths and interests, allowing them to contribute meaningfully to the workforce. This approach promotes inclusivity and empowers individuals to overcome limitations, fostering a sense of independence, productivity, and self-worth (Wehman et al., 2021). Job coaches can use job carving to create a work environment that recognizes and harnesses the diverse talents and capabilities of individuals with ID.
2. **Digital task analysis**. The IPSE program faculty and staff can develop digital-based task analysis to help students with ID learn new digital literacy skills. Task analysis involves breaking down a skill into sequential steps to match students' abilities (Randall et al., 2020). Presenting each step in order allows students to

follow the steps logically and perform the task correctly, which is critical for persons with ID learning new and complex skillsets. Staff can also teach students how to create task analysis on their own. Access to the task on a phone or other digital devices can help persons with ID achieve independence, an essential component to obtain and sustain employment (Randall et al., 2020). By utilizing task analysis, IPSE program staff can break down complex digital skills into manageable components, cater to individual learning needs, and effectively support students with ID in acquiring new skills.

3. **Competency-based credentials.** Competency-based credentials are certifications or qualifications awarded based on an individual's demonstrated mastery of specific competencies or skills (Thorne et al., 2023). These credentials focus on assessing and validating a person's abilities and proficiency in performing specific tasks or functions relevant to a particular profession or industry. A typical digital technology competency-based credential used in career programs are digital badges. According to 1EdTech Foundation (2021), digital badges are a widely awarded micro-credential, with over 40 million badges awarded to date. These credentials are often valued by employers who prioritize practical skills and performance-based outcomes.

   Competency-based credentials can be an alternative or complement to traditional degrees or certifications, offering individuals a flexible and targeted pathway to demonstrate their expertise in a specific field (Braxton et al., 2023), which is

beneficial for individuals with ID. By incorporating competency-based credentials into IPSE programs, individuals with ID receive targeted, practical training, while organizations benefit from a more skilled and qualified workforce that meets their specific needs.

Implementing these strategies can promote and empower students with ID to develop essential 21st-century digital technology skills; this, in turn, enhances their independence, employability, and overall inclusion in the digital society.

Recommendations for Future Research

After analyzing the results of this investigation and considering the limited research on this topic, the researcher identified areas of future research to expand the literature on the digital preparation of students with ID enrolled in IPSE programs. The first research topic involves creating a connection between education and career preparation for students with disabilities and computer science to address the diversity of the topics. Conducting interdisciplinary research allows for synthesizing concepts and characteristics from various disciplines, which is essential for unraveling multilayered topics such as this. Additionally, interdisciplinary research emphasizes the importance of diverse partners and networks, which often provides a bridge between research, policy, and practice (Brown et al., 2019).

As noted in the literature review, more research is needed to explore digital technology preparation for students with ID in transition and inclusive postsecondary education. Research investigating how the current digital technology standards used throughout the U.S. (the ISTE Standards) are being implemented in K-12 education for students with more significant disabilities and how transferable and relevant the skills are toward students' postsecondary goals

could provide a platform for further discussion on digital technology standards and practices for the population. Research in this area is critical for developing digitally competent citizens. Specifically, information is needed on the type and quality of preparation students with ID receive throughout their K-21 education. All students deserve to be prepared with the skills necessary for success inside and outside the classroom, regardless of ability or disability category.

Another direction researchers can explore to strengthen digital literacy for persons with ID is assessing pre- and in-service educators' digital technology competence. If special educators, transition educators, and other support personnel involved in workforce preparation of their students improve their knowledge about digital technology their students' outcome will be directly affected (Dogan & Robin, 2008; Lee et al., 2021). Therefore, assessing educators' digital technology competence is critical to understanding whether teachers are prepared with the knowledge and tools necessary to teach students with disabilities digital literacies and, if not, what teacher preparation and professional development is required to address the skill gap.

The data in the current study were not disaggregated by industry. Therefore, another area for future research involves determining which digital technology competencies and skills are in demand and the digital proficiency expected in entry-level employees in the industries most likely to hire individuals with ID. Furthermore, evaluating IPSE programs' instructional practices in digital technology preparation and students' digital literacy competence post-instruction would also further this research and assist in establishing best practices for the population. Finally, additional exploratory research on this topic will add to the inclusive

postsecondary literature and inform various stakeholders devoted to individuals with ID career preparation and employment.

Limitations

Due to the sampling procedures applied in this study, it was not possible to collect any identifiable information from the sample, thereby preventing the researcher from gather more in-depth data. The use of focus groups would have allowed U.S. employers to expand their perceptions of the importance of digital technology skills for entry-level employees. Therefore, using Qualtrics©^{xm} sampling services for the current study did present a limitation. Another limitation of this study was the researcher-developed instrument. Though the researcher used a framework to develop the survey, several modifications were made to fit the study better. Although the role of instrument psychometric properties was used to address this concern, employing an instrument with robust reliability and validation data is ideal and would have strengthened the study. Lastly, the researcher's use of only publicly accessible data sources also limited the scope of this exploration. Though the researcher contacted programs directly for clarification on digital preparation information found online, if no digital technology preparation was presented online, the researcher did not contact the program to verify. While conducting college or program searches via the internet is typical, programs may not provide every detail of their program online.

Conclusion

Recent changes in the workforce have increased the importance of completing a certain amount of postsecondary education to compete in the job market (Pew Research Center, 2016). Over the past two decades, IPSE programs have been identified as a bridge to employment for

people with ID (Grigal & Papay, 2018; Hendrickson et al., 2017; Prohn et al., 2018). Thus, according to Southward and Kyzar (2017) and Grigal and colleagues (2019b), participation in IPSE programs predicts competitive pay for individuals with ID.

With an increased enrollment of individuals with ID into IPSE programs and the relationship between IPSE attendance and competitive pay, stakeholders must focus on providing students with career preparation and development that aligns with the needs of the field. In addition, a robust line of literature has established that digital literacy is a 21st-century skill in strong demand in the workforce (Siddiq et al., 2016; Van Laar et al., 2017, 2020; Voogt & Roblin, 2012). Therefore, integrating the digital literacy and skill development required in the workforce within the curriculum of IPSE programs is critical.

The results of analyzing the digital technology skills important in the U.S. workforce and the digital technology preparation at IPSE programs provide program administrators and other stakeholders valuable insight into the digital competencies most valued for employment and the current level of relevant training at IPSE programs. This study's overarching question was whether IPSE programs for individuals with ID are preparing them with the digital technology skills employers deem important in the 21st century. Given that 51% of the programs sampled did not address any digital technology preparation based on their publicly accessible information and more than 75% of the preparation addressed only two competence areas of digital literacy and at a very basic level. The researcher must conclude that IPSE programs are currently not sufficiently preparing students with the type of digital technology preparation required for them to be competitive in today's job market.

Digital technology is becoming a topic of great interest for researchers, policymakers, educators, and organizations. However, digital technology preparation for perons with ID has yet to receive the persistent research and discussion it deserves. The current study contributes to that research and reinforces that all individuals with and without disabilities should be prepared to enter employment with the skills necessary to be successful in the workplace.

APPENDIX A:
INSTITUTIONAL REVIEW BOARD CONSENT

UNIVERSITY OF CENTRAL FLORIDA

Institutional Review Board
FWA00000351
IRB00001138, IRB00012110
Office of Research
12201 Research Parkway
Orlando, FL 32826-3246

EXEMPTION DETERMINATION

April 24, 2023

Dear Erika Moore:

On 4/24/2023, the IRB determined the following submission to be human subjects research that is exempt from regulation:

Type of Review:	Modification / Update, Modification / Update
Title:	An Exploration of Employers' Perception of Digital Technology Skills Required Versus the Digital Technology Skills Evident in Employees with Developmental Disabilities
Investigator:	Erika Moore
IRB ID:	MOD00003959
Funding:	None
Grant ID:	None
Documents Reviewed:	• DL_Dissertation_Study_Survey_-_Copy.docx, Category: Survey / Questionnaire; • MOD 3959, Consent, TrkChg1.pdf, Category: Consent Form; • MOD 3959, Protocol, TrkChg2.docx, Category: IRB Protocol

This determination applies only to the activities described in the IRB submission and does not apply should any changes be made. If changes are made, and there are questions about whether these changes affect the exempt status of the human research, please submit a modification request to the IRB. Guidance on submitting Modifications and Administrative Check-in are detailed in the Investigator Manual (HRP-103), which can be found by navigating to the IRB Library within the IRB system. When you have completed your research, please submit a Study Closure request so that IRB records will be accurate.

If you have any questions, please contact the UCF IRB at 407-823-2901 or irb@ucf.edu. Please include your project title and IRB number in all correspondence with this office.

Sincerely,

Jonathan Coker
Designated Reviewer

APPENDIX B:
RECRUITMENT MATERIAL/EXPLANATION OF RESEARCH

EXPLANATION OF RESEARCH

Title of Project: An Exploration of the Digital Technology Skills Important in the Workforce and the Digital Technology Preparation of Individuals with Intellectual Disabilities in Inclusive Postsecondary Education Programs
Principal Investigator: Erika Moore
Faculty Supervisor: Rebecca Hines, Ph.D.

You are being invited to take part in a research study. Whether you take part is up to you.

The purpose of this study is to evaluate whether Inclusive Postsecondary Education (IPSE) programs are equipping individuals with intellectual disabilities with the digital technology skills employers require in the workforce at entry-level. For this study, an individual with a developmental disability is defined as a person with a deficient in intellectual, behavioral, conceptual, and social functioning. The survey will help researchers understand digital technology skills critical in today's workforce by assessing the skills perceived as important by employers and those being digital technology skills being taught at IPSE.

You must be 18 years of age or older to take part in this research study. Additionally, to participate in this study, you must be employed by a U.S. organization that hires employees with developmental disabilities. Your job description must include hiring, managing, directing, or supervising employees.

The online survey will only take 15 minutes to complete. Your participation in the survey is completely voluntary and all your responses will be kept confidential. No personally identifiable information will be associated with your responses to any reports of these data.

Upon the completion of the survey, you will be compensated with the incentive agreed on during recruitment in Qualtrics' market research panel. The incentive may take up to 5 business days to reflect in your account.

Study contacts for questions about the study or to report a problem: If you have questions, concerns, or complaints contact Erika Moore, Principal Investigator, Graduate Student, Exceptional Education Program, College of Community Innovation and Education, (407) 823-6705 or Dr. Hines, Faculty Advisor, School of Teacher Education at (407) 823-2835 or by email at Rebecca.hines@ucf.edu.

IRB contact about your rights in this study or to report a complaint: If you have questions about your rights as a research participant, or have concerns about the conduct of this study, please contact Institutional Review Board (IRB), University of Central Florida, Office of Research, 12201 Research Parkway, Suite 501, Orlando, FL 32826-3246 or by telephone at (407) 823-2901, or email irb@ucf.edu.

APPENDIX C:
SURVEY DRAFT

Digital Literacy Dissertation Study Survey

Start of Block: Introduction

Q1 Research explanation/consent form

End of Block: Introduction

Start of Block: Consent

Q2 I give consent to participate in this study

- No
- Yes

End of Block: Consent

Start of Block: Prescreening questions

*

Q3 Which region best describes your organization's location?

- ☐ Northeast (CT, DE, DC, ME, MD, MA, NH, NJ, NY, PA, PR, RI, VT, VI, VA, and WV)
- ☐ Southeast (AL, FL, GA, KY, MS, NC, SC, and TN)
- ☐ Midwest (IL, IN, IA, KS, MI, MN, MO, NE, OH, and WI)
- ☐ Southwest (AR, CO, LA, MT, NM, ND, OK, SD, TX, UT, and WY)
- ☐ West (AK, AZ, CA, HI, ID, NV, OR, and WA)
- ☐ Other _____

Page Break

Q4 Which industry best describes your organization?

- [ ] Advertising and marketing
- [ ] Aerospace
- [ ] Agriculture
- [ ] Computer and technology
- [ ] Construction
- [ ] Education
- [ ] Energy
- [ ] Entertainment
- [ ] Fashion
- [ ] Finance and economic
- [ ] Food and beverage

- [ ] Health care
- [ ] Hospitality
- [ ] Manufacturing
- [ ] Media and news
- [ ] Mining
- [ ] Pharmaceutical
- [ ] Transportation
- [ ] Telecommunication
- [ ] Other _____

Page Break

Q5 Which designation best describes your organization?

- ○ Public (listed on a stock exchange)
- ○ Private (not listed on a stock exchange)
- ○ Not Applicable

Page Break

Q6 Which size classification best describes your organization?

- ○ Micro (
- ○ Small (10 to 49 employees)
- ○ Medium (50 to 249 employees)
- ○ large (>250 employees)

Page Break

Q7 What is your job title at your organization?

_____

End of Block: Organization Demographics

Start of Block: Skills and Competencies

Q8 Is digital proficiency important in your organization's entry-level employees?

Digital proficiency refers to the ability to use technology to complete a task.

- ○ No
- ○ Yes

Page Break

Q9 How important is digital proficiency in your organization's entry-level employees?

- Very Important
- Important
- Slightly Important

End of Block: Prescreening questions

Start of Block: Organization Demographics

Q10 Are digital information and data literacy skills important in your organization's entry-level employees?

Digital Information and data literacy skills include evaluating digital data sources and accessing, manipulating, and summarizing digital data.

- No
- Yes

Page Break

Q11 Read the prompt and indicate your response on the scale.

These digital information and data literacy skills are important in entry level employees at my

organization

	Very Important	Important	Slightly Important	Not Important At All	Not Applicable
Browsing and searching digital information and content (i.e., using keywords to locate sources, sites, and content)	○	○	○	○	○
Filtering digital data, information, and content (i.e., Evaluating sources, sites, and content)	○	○	○	○	○
Managing digital data, information and content (i.e. managing numerous data systems and networks)	○	○	○	○	○

Page Break

Q12 For this question, rank these digital information and data literacy skills in order of importance in entry level employees at your organization.

Click on the text to move the skill in ranking order.

_____ Browsing and searching digital content (i.e., using keywords to locate sources, sites, and content)

_____ Filtering digital data, information, and content (i.e., Evaluating sources, sites, and content)

_____ Managing digital data, information and content (i.e. managing numerous data systems and networks)

Page Break

Page Break

Q13 Are digital communication and collaboration skills important in your organization's entry-level employees?

Digital communication and collaboration include communicating in text-based forums or building digital networks through social media.

- ○ No
- ○ Yes

Page Break

Q14 Read the prompt and indicate your response on the scale.

These digital communication and collaboration skills are important in entry level employees at my organization

Note:

Netiquette describes the rules of conduct for respectful and appropriate communication on the

internet.

Citizenship refers to the membership of a community.

	Very Important	Important	Slightly Important	Not Important At All	Not applicable
Interacting through digital technologies (i.e., using electronic tools, systems, devices to engage with others)	○	○	○	○	○
Sharing through digital technologies (i.e., using electronic tools, systems, and devices to share information)	○	○	○	○	○
Engaging in citizenship through digital technologies (i.e., using electronic tools, systems, and devices to engage in social media groups, online forums, or group text chats)	○	○	○	○	○

Collaborating through digital technologies (i.e., using electronic tools, systems, and devices to work with others)	○	○	○	○	○
Netiquette (i.e., language and tone used when communicating online)	○	○	○	○	○
Managing digital identity (i.e., managing and securing digital identities through authentication or encryption)	○	○	○	○	○

Page Break

Q15 For this question, rank these digital communication and collaboration skills in order of importance in entry level employees at your organization

_____ Interacting through digital technologies (i.e., using electronic tools, systems, devices to engage with others)

_____ Sharing through digital technologies (i.e., using electronic tools, systems, and devices to share information)

_____ Engaging in citizenship through digital technologies (i.e., using electronic tools, systems, and devices to engage in social media groups, online forums, or group text chats)

_____ Collaborating through digital technologies (i.e., using electronic tools, systems, and devices to work with others)

_____ Netiquette (i.e., language and tone used when communicating online)

_____ Managing digital identity (i.e., managing and securing digital identities through authentication or encryption)

Page Break

Q16 Are digital content creation skills important in your organization's entry-level employees?

Digital content creation include producing and sharing information or digital content.

- ○ No
- ○ Yes

Page Break

Q17 Read the prompt and indicate your response on the scale.

These digital content creation skills are important in entry level employees at my organization

	Very Important	Important	Slightly Important	Not Important At All	Not applicable
Developing digital content (i.e., creating written or visual digital content)	○	○	○	○	○
Integrating digital content (i.e., synchronizing digital content across platforms and devices)	○	○	○	○	○
Editing digital content (i.e., editing written or visual digital content)	○	○	○	○	○
Understanding copyright licenses (i.e., using copyrighted materials, obtaining permission for content)	○	○	○	○	○
Programming (i.e., coding; analyzing, generating, and implementing algorithms)	○	○	○	○	○

Page Break

Q18 For this question, rank these digital content creation skills in order of importance in entry level employees at your organization.

Click on the text to move the skill in ranking order.

_____ Developing digital content (i.e., creating written or visual digital content)

_____ Integrating digital content (i.e., synchronizing digital content across platforms and devices)

_____ Editing digital content (i.e., editing written or visual digital content)

_____ Understanding copyright licenses (i.e., using copyrighted materials, obtaining permission for content)

_____ Programming (i.e., coding; analyzing, generating, and implementing algorithms)

Page Break

Q19 Are digital safety skills important in your organization's entry-level employees?

Digital safety include understanding and recognizing threats that exist on the internet.

- ○ No
- ○ Yes

Page Break

Q20 Read the prompt and indicate your response on the scale.

These digital safety skills are important in entry level employees at my organization

	Very Important	Important	Slightly Important	Not Important At All	Not applicable
Protecting digital devices (i.e., Installing anti-virus and malware protection)	○	○	○	○	○
Protecting personal digital data and privacy (i.e., Using strong passwords, back up data)	○	○	○	○	○
Protecting digital health and well-being (i.e., healthy relationship with technology)	○	○	○	○	○
Protecting the rights of others in digital environments (i.e., Protecting people's fundamental online rights)	○	○	○	○	○

Page Break

Q21 For this question, rank these digital safety skills in order of importance in entry level employees at your organization

Click on the text to move the skill in ranking order.

_____ Protecting digital devices (i.e., Installing anti-virus and malware protection)

_____ Protecting personal digital data and privacy (i.e., Using strong passwords, back up data)

_____ Protecting digital health and well-being (i.e., healthy relationship with technology)

_____ Protecting the rights of others in digital environments (i.e., Protecting people's fundamental online rights)

Page Break

Q22 Are digital problem-solving skills important in your organization's entry-level employees?

Digital problem-solving include identifying and solving technical problems when operating devices and using digital environments.

- ○ No
- ○ Yes

Page Break

Q23 Read the prompt and indicate your response on the scale.

These digital problem-solving skills are important in entry level employees at my organization

	Very Important	Important	Slightly Important	Not Important At All	Not applicable
Solving technical problems (i.e., solving a technical issue using technology)	○	○	○	○	○
Identifying needs and technological responses (i.e., Understanding what's needed to solve a technical issue)	○	○	○	○	○
Creatively using digital technologies (i.e., using devices, apps, or software to create a digital product or content)	○	○	○	○	○
Identifying digital competencies gaps (i.e. identifying weaknesses or limitations in digital knowledge)	○	○	○	○	○

Page Break

Q24 For this question, rank these digital problem-solving skills in order of importance in entry level employees at your organization

Click on the text to move the skill in ranking order.

_____ Solving technical problems (i.e., solving a technical issue using technology)

_____ Identifying needs and technological responses (i.e., Understanding what's needed to solve a technical issue)

_____ Creatively using digital technologies (i.e., using devices, apps, or software to create a digital product or content)

_____ Identifying digital competencies gaps (i.e. identifying weaknesses or limitations in digital knowledge)

Page Break

Q25 For this question, rank the following digital technology skills in order of importance at your organization

Click on the text to move the skill in ranking order.

_____ Digital information and data literacy

_____ Digital communication and collaboration

_____ Digital content creation

_____ Digital safety

_____ Digital problem solving

End of Block: Skills and Competencies

Start of Block: Organizational Training Questions

Q26 Is digital proficiency stated as a skillset on job postings for entry-level positions at your organization?

- ○ No
- ○ Yes

Page Break

Q27 What is the likelihood of a person with emerging digital competence being successful at an entry-level position at your organization?

- ○ Extremely unlikely
- ○ Unlikely
- ○ Likely
- ○ Extremely likely

Page Break

Q28 Does your organization offer digital technology training to employees at your organization?

- ○ No
- ○ Yes

Page Break

Q29 Through what modality do your organization offer digital technology training?

Select all that apply

- ☐ Computer- based training
- ☐ On-the-job training
- ☐ Instructor-led training
- ☐ Coaching/mentoring
- ☐ Other _____

Page Break

Q30 Does your organization hire individuals with disabilities?

- ○ No
- ○ Yes
- ○ I do not know

Page Break

Q31 Are individuals with disabilities currently employed at your organization?

- ○ No
- ○ Yes
- ○ I do not know

Page Break

Q32 Does your organization offer competitive integrated employment (CIE) for individuals with disabilities?

Competitive integrated employment refers to individuals working in the community, alongside people with and without disabilities, at competitive wages.

- ○ No
- ○ Yes
- ○ I do not know

Page Break

Q33 Does your organization customize training for individuals with disabilities hired at your organization?

- No
- Yes
- I do not know

Page Break

Q34 What is the likelihood of your organization offering customized training to individuals with disabilities at your organization in the future?

- Extremely unlikely
- Unlikely
- Likely
- Extremely likely

Page Break

Q35 What supports would be helpful with assisting your organization with offering customized training to individuals with disabilities?

Select all that apply

- ☐ Coaching/mentoring from a disability organization
- ☐ Films and videos from a disability organization
- ☐ Simulations
- ☐ Instructor-led training from a disability organization
- ☐ Other _____

Page Break

Q36 What supports were helpful with assisting your organization with offering customized training to individuals with disabilities?

Select all that apply

- ☐ Coaching/mentoring from a disability organization
- ☐ Films and videos from a disability organization
- ☐ Simulations
- ☐ Instructor-led training from a disability organization
- ☐ Other _____

End of Block: Organizational Training Questions

APPENDIX D:
DATA COLLECTION GUIDE

Data Collection Guide

Start of Block: Program Demographics

Q1 Sample number

_____

Q2 Program name

_____

Q3 Program region

- ○ Northeast (CT, DE, DC, ME, MD, MA, NH, NJ, NY, PA, PR, RI, VT, VI, VA, & WV)
- ○ Southeast (AL, FL, GA, KY, MA, NC, SC, and TN)
- ○ Midwest (IL, IN, IA, KS, MI, MN, MO, NE, OH, & WI)
- ○ Southwest (AR, CO, LA, MT, NM, ND, OK, SD, TX, UT, & WY)
- ○ West (AK, AZ, CA, HI, ID, NV, OR, & WA)
- ○ Other

End of Block: Program Demographics

Start of Block: Program information

Q11 Program length

- [ ] less than 12 months
- [ ] 2 years
- [ ] 3 years
- [ ] 4 years
- [ ] Varies from student to student

Q10 Students take courses that are only for students in this program:

- ○ Yes
- ○ No
- ○ Not stated

Q12 Students enrolled in this program take the following types of inclusive courses (with students who don't have disabilities):

- [ ] Typical college courses for audit
- [ ] Typical college courses for credit
- [ ] Typical Continuing Education course
- [ ] Students do not take typical college courses

Q13 Percentage of academic time spent in inclusive courses (with students who don't have disabilities):

- ○ 0%
- ○ 1-24%
- ○ 25-49%
- ○ 50-74%
- ○ 75-99%

Q14 Credential(s) students earn upon completing the program:

_____

Q15 Is the credential approved by the college/university?

- ○ Yes
- ○ No

Q16 Any other credentials that are available to all students?

_____

End of Block: Program information

Start of Block: Document Analysis

Q17 Document type

- ☐ Think College Website
- ☐ PSP Website
- ☐ Sample Course Schedule
- ☐ Program Curriculum/Course Catalogue
- ☐ Other _____

Q4 Content

_____

Q18

Q5 Code

- [ ] Digital information and data literacy
- [ ] Digital communication and collaboration
- [ ] Digital content creation
- [ ] Digital safety
- [ ] Digital problem solving
- [ ] Digital Literacy

Q9 Notes

_____

APPENDIX E:
CODING GUIDE

Digital Information and Data Literacy	**Digital Communication and Collaboration**	**Digital Content Creation**	**Digital Safety**	**Digital Problem Solving**	**Digital Literacy**
Definition					
Ability to identify, locate, retrieve, store, organize and analyze digital information, judging its relevance and purpose.	Ability to communicate in digital environments, share resources through online tools, link with others and collaborate through digital tools, interact with and participate in communities and networks, cross-cultural awareness	Ability to create and edit new content (from word processing to images and video), integrate and re-elaborate previous knowledge and content, produce creative expressions, media outputs and programming and deal with and apply intellectual property rights and licenses.	Ability to personal protection, data protection, digital identity protection, security measures, safe and sustainable use.	Ability to identify digital needs and resources, make informed decisions as to which are the most appropriate digital tools according to the purpose or need, solve conceptual problems through digital means, creatively use technologies, solve technical problems and update one's own and others' competences.	Combination of knowledge, skills and attitudes, through technology, to perform tasks, solve problems, communicate, manage information, collaborate create and share content effectively, appropriately, securely, critically, creatively, independently and ethically.
Skills					
Knowing which words to use in order to find what you need quickly Understanding that different search engines may give different search results	Knowing which communication tools and services (e.g. phone, email, video conference, text message) are appropriate to use	Knowing how to create and edit digital text files and how to produce multimedia presentations Editing digital content that others have created and	Identifying suspicious e-mail messages that try to obtain your personal data Refusing access to your geographical location	When facing a technical problem, you are able to find solutions on the Internet Selecting the right tool, device or service to perform a given task	Information and Data Literacy, Communication and Collaboration, Content Creation, Safety, Problem Solving

Digital Information and Data Literacy	**Digital Communication and Collaboration**	**Digital Content Creation**	**Digital Safety**	**Digital Problem Solving**	**Digital Literacy**
Checking if the information found online is reliable Organizing content such as documents, images, and videos using folders, or tagging to find them back later	in different circumstances. Understanding how to apply for a job using a digital platform Editing shared, online documents Knowing how to behave online according to the situation	creating something new by mixing different types of content Differentiating between legal and illegal online content Knowing that there are different programming languages to provide instructions to a computer	Configuring settings of a firewall on different devices Reducing energy consumption of your devices	Knowing that digital technology can be used as a powerful tool to produce creative outputs Using online learning tools to improve your digital skills	
Keywords					
Searching, Evaluating, Managing data	Sharing, Netiquette, Interacting, Collaborating, Digital identity, engaging in citizenship	Developing content, Copyright and licenses, editing content, programming	Protecting health, protecting environment, protecting data, protecting devices	Creativity and technology, identifying competence gaps, technological response, technical problems	Digital Literacy
Examples					
Cloud storage, job search, Microsoft© Excel, Word, tagging, browsing, keyboarding, data	Digital citizenship, Linked In, Outlook, Gmail, online forums, digital technologies. Video	PowerPoint, programming, coding, digital art, social media, visual aids, video,	Cybersecurity, cyber spyware, password protection, multi-factor	Troubleshooting, technical solutions, IT, computer science, software development,	Digital technology competence, digital technology proficiency

Digital Information and Data Literacy	Digital Communication and Collaboration	Digital Content Creation	Digital Safety	Digital Problem Solving	Digital Literacy
entry, computer skills	conferencing platforms, computer applications	presentations, web design/development	authentication, e-safety/internet safety, firewall	hardware engineering, computational thinking, computer system analyst	

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