A MIXED-METHODS EXPLORATION OF COMMUNITY COLLEGE ADMINISTRATORS' ASSUMPTIONS ABOUT THE BASIC COMPUTER SKILLS OF INSTRUCTORS AND STUDENTS

A Dissertation
by
KATRINA LEWIS BOONE

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Abstract

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COMMUNITY COLLEGE ADMINISTRATORS' ASSUMPTIONS
ABOUT THE BASIC COMPUTER SKILLS OF INSTRUCTORS AND STUDENTS

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Community college administrators and leaders have assumptions about the students' and instructors' basic computer skills that may or may not be accurate, and there may not be adequate support structures and training available. This study shows that the lack of even basic computer literacy skills can affect academic success and the ability of instructors to integrate technology in their teaching effectively. This mixed-methods study investigates the assumptions made by community colleges about the computer literacy skills of students and instructors and explores the accuracy of these assumptions and the student experience through digital and visual methods. Community colleges' role in serving a wide range of learners from all walks of life, socioeconomic status and rural areas. If they do not have systems in place to assess the basic computer literacy skills of students (and their instructors), creating barriers in the progression toward the workforce and career success. Findings show

that administrators assumptions are more positive towards instructors than students to have basic computer skills by emphasizing the disparities across demographic groups. Various methods were employed for data collection, including Northstar digital computer skills assessment scores, online surveys, and digital storytelling. Analysis of student data revealed prevalent themes related to varied exposure to technology in early childhood, language barriers and the use of alternative devices to compensate for their lack of access or skills. The research promotes a call to action for community colleges to challenge assumptions, offer personalized support, and prioritize continuous professional development for instructors. Acknowledging the far-reaching influence of computer literacy on both academic, personal and professional success, the study underscores the critical need for ensuring equitable access to technology, skill-building training and resources to address current disparities.

Key Words: computer literacy, constructivism, pragmatism, digital literacy, basic computer skills, community college, technology integration, teaching technology, technology in education

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Dedication

To my loving and supportive Parents,

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With heartfelt gratitude and love,

Katrina Lewis Boone, Ed.D.

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Chapter 1: Introduction

I begin this study from the perspective of an educator and administrator, but also as a human navigating a complex, warp-speed, ever-advancing technological landscape. In the present-day economy that values knowledge, there is a common belief that the potential for progress, originality, and competitiveness lies in having a workforce that possesses advanced technology skills, often obtained through the educational system beginning in K-12 through post-secondary education pathways. The urgency for enhanced skill development in the early stages of education and a basic fundamental understanding of technology is increasingly apparent, as emphasized in both popular and academic literature (Riel & Christian, 2012).

The purpose of higher education institutions, specifically community colleges, is to provide a learning environment that offers specialized programs, vocational training, and technological skill areas. This study will center around community colleges as they “are a crucial point of access to higher education for many individuals seeking additional education beyond high school" (Calcagno et al., 2008, p. 632). Community College administrators and educators Riel and Christian (2012) believe that while assessment is vital for K-12, studying the impact of new literacies (i.e., computer, digital) within higher education is equally important. Their study indicates that this is especially important due to the large numbers of adult and non-traditional students attending community college today to gain new technology skills and prepare for new careers in this knowledge economy.

The findings of this study can inform college leaders’ decisions around technology support and training by helping them gain a deeper understanding of the computer literacy levels of students and instructors. It will help them understand what overall themes emerge from the

student and instructor experiences with computer technology, and gain a shared understanding of what are the fundamental skills that determine one's literacy.

Despite assumptions of ability, evidence in the literature shows that there are still populations of community college students and instructors who struggle with technical skills, and contributes to the widening gaps between institutional expectations of access and their realities (Regalado, 2010). Creighton et al. (2006) reported that only nine states had some form of computer literacy requirement for secondary graduation. Research conducted by the Community College Research Center (2013) at Columbia University found that many community college students need help with basic computer skills and need to prepare for online learning. The study found that while students did not consider themselves underprepared, instructors were frustrated by the perceived lack of student preparedness. The study also indicates that technological under-preparedness may be more widespread than the students in the study realized (Community College Research Center, 2013). Ragin (2013) shared feedback from the instructors and their perspective of student computer skills. One shared that the colleges assume that everyone is computer literate now, and they are not. Younger students are less literate than maybe their parents. “They can text and do the ‘thumb thing,’ but as far as navigating on a computer, they are uncomfortable” (p. 10). Ragin (2013) stressed that years into post-pandemic times, the skills gaps in community colleges have significantly widened. The poor class performance indicates that students were and are not prepared for college-level work upon initial enrollment (Ragin, 2013).

Earlier research reported that people living in rural areas, inner cities, and poverty most often lacked computer equipment and access to the Internet (Katsinas, 2002). Age has been another factor that played a role in the technological access gap. Students who do not possess prior computer skills should be identified during the admissions process (Ragin, 2013).

Understanding these students' identities during enrollment can help educators align curriculum objectives with their pedagogical practices and benefit them through remediation or interventions before course placement (Ragin, 2013). Sargrad (2020) warned that even if schools can provide computers and the Internet, these students were operating at lower levels of computer literacy than students who use computers regularly. Sargrad argued that the opportunity gap between these students and their white and wealthier peers would continue to grow without addressing this additional barrier.

To establish the background and context of this study, I will define computer literacy based on the conceptual model of core digital literacies introduced and developed by Riel and Christian (2012). The model identifies tools and interfaces as the initial set of core skills. The skills within this category focus on the knowledge and use of computer systems, hardware, applications, and elements of the designed world. A person considered digitally literate should have at least a basic familiarity with how computer systems and networks work and how to interact within them (Pearson & Young, 2002). Individuals who demonstrate these skills should have a practical understanding of how to interact with the basic tenets of hardware and software common to information technology, and a fundamental understanding of the concepts of computing design and its limitations (Riel, 2012).

Background of the Problem

Childers (2003) explored the definitions of computer literacy and found that the evolving terminology may have changed, but the fundamental importance of acquiring basic computer skills remains evident. Reflecting on the history of the computer literacy movement provides a foundation for shaping a definition that endorses the significance of these skills. He argues that despite the diminished use of the term "computer literacy" in contemporary library literature, the

underlying belief in the value of a basic skill set for using computers persists. Childers (2003) raised the question: has the original goal of ensuring a basic level of computer proficiency for the general population been achieved, or has it transformed into a different objective? The premise of this study aligns with Childers (2003) who said the terminology may have shifted to encompass terms like computer competency, digital literacy, computer skills, Internet literacy, informatics, computer proficiency, and others, all of which have been in use for over two decades.

A major concern in technology and education is the lack of access to computers. The lack of computer access, among other factors, has led to the technological gap in society known as the digital divide. Studies have concluded that technological competence is increasingly becoming critical in educational settings. The technological gap in society is evident in education and "can be measured in terms of access to computer technology, competence and confidence in the use of computer technology, and attitudes toward the use of computer technology in learning" (Regalado, 2010, p. 21). Today, many students belong to the digital generation. Communication methods in education, including teacher-student communication, are going through significant shifts that reflect the culture of a new generation of students, and the rapid spread and advancement of communication technology (Kemp et al., 2014). They proposed questions in the study that focused on the relation of technology to education. One of these questioned the number of graduating students who succeed in distance education in high school and go on to be admitted to an accredited college/university. They also asked how often teachers only accustomed to the physical building have the opportunity for professional development that focuses on the difference between in-person teaching and online. Kemp et al. (2014) expressed that participants faced challenges from the lack of adequate training and experienced difficulty in finding ways to

transition from the traditional classroom to online. Did students struggle in the same way and face similar challenges (Kemp et al., 2014)? Kemp et al. (2014) stated:

> It was noted several times throughout the discussion that technologies such as the Internet and personal computers do not increase access or improve learning for all potential students. The most fundamental drawback is the unequal availability of technologies for people of low socioeconomic status. The concern is that technology is benefiting only those with access while alienating those who cannot participate. Some authors think that the use of technology to access education could widen the gap between the haves and the have-nots, and perhaps make this divide more permanent. (p. 17)

Much of the existing literature shows that students in community colleges identify with historically underserved and marginalized communities, first-generation students who are the first in their families to attend college, low-income students, English language learners, newcomers to the United States, and students with physical and cognitive disabilities (Patterson, 2009). Focusing solely on digital and information literacy may assume that students have prior knowledge of computers and associated skills that they need to possess and create barriers that inhibits learning new concepts and skills. There may be groups of community college students who may lack access to the latest computer technology, digital tools, and resources. Shifting too quickly to digital and information literacy can assume that all students have equal access to computers, digital technology, and resources, which is not always true. When community colleges do not have systems in place to assess the basic computer literacy skills of students (and their instructors), many students can be left struggling to keep up with their coursework and creating barriers in the progression toward the workforce and career success.

There should be a rising concern among policymakers, college educators, and students about the digital divide, which refers to the idea that different groups of students possess varying technological and digital abilities. Common indicators of this divide include age, location (urban or rural), income, and other socioeconomic factors (Riel & Christian, 2012). The findings in the literature align with the technology shift in education, and the terminology has changed from computer to digital and information literacy. This research brings different approaches to computer literacy and why basic computer literacy is still an essential foundation, even in the digital and information literacy era. While the focus has shifted towards digital and information literacy, basic computer literacy remains a fundamental set of skills required to use and interact with digital technology.

Definition of Terms

Technology. Technology are entities that produce artificial functions or produced by a problem-solving process that changes and transforms the world to generate a desired artificial function (Nightingale, 2014). Technology constructs a bridge whereby students can participate in their learning practices, an engagement that allows them to develop in a post-industrial civilization as professionals (Ayaz & Sekerci, 2015, as cited in Washington et al., 2020). With the advances of the Internet, technology is a critical component in education (Washington et al., 2020).

Community Colleges. Generally, 2-year colleges are supported by local, regional, national, or global communities. These 2-year career and technical colleges offer low-cost pathways to higher education and provide academic coursework, vocational training, and continuing education courses (Ireland, 2014; Shurts, 2016).

Digital Immigrants. Individuals who grew up without technology and learned to use it later in life (Chaves et al., 2016; Kirk et al., 2015). The "digital immigrant accent" can be seen in such things as turning to the Internet for information second rather than first or reading a program's manual rather than assuming the program will teach us to use it. Today's older folk were "socialized" differently from their kids and are now in the process of learning a new language (Prensky, 2001).

Digital Native. "Native speakers" of the digital language of computers, video games, and the Internet. Kindergarten through college students represent the first generations to grow up with this new technology. They have spent their entire lives surrounded by and using computers, video games, digital music players, video cams, cell phones, and all the other toys and tools of the digital age (Prensky, 2001).

Computer Literacy. Luehrmann defines computer literacy as “the ability to do computing. This translates into hands-on experience with the computer by learning to control and program it using a computer language” (Luehrmann, 1981, p. 682 as cited in Anderson, 1982). Computer literacy is also defined as the knowledge and use of computer systems, hardware, applications, and elements of the designed world. One who is considered digitally literate is expected to have at least a basic familiarity with how computer systems and networks work and how to interact within them (Pearson & Young, 2002). Individuals who demonstrate these skills should have a practical understanding of the how-to of interacting with the basic tenets of hardware and software common to information technology, and a fundamental understanding of the concepts of computing design and its limitations (Riel, 2012).

Digital Literacy. Digital literacy is defined as the ability to find and evaluate information online, can use email and search engines, and can evaluate a Web Site, other online resources, and other information resources (Boechler et al., 2014).

Information Literacy. Information literacy (IL) is the "set of literacies or competencies that an informed citizen needs to participate judiciously and actively in the information society" (Pinto & Sales, 2010, p. 618, as cited in Boechler et al., 2014).

Nontraditional Student. The U.S Department of Education (2015) defines nontraditional student as anyone who delays enrollment (does not enter post-secondary education in the same calendar year that high school ended), attends part-time for at least part of the academic year, works full-time (35 hours or more per week) while enrolled, is considered financially independent for purposes of determining eligibility for financial aid, has dependents other than a spouse (usually children but may also be caregivers of sick or elderly family members), or does not have a high school diploma (completed high school with a GED or other high school completion certificate or did not finish high school).

The Evolution of Terms and Definitions

Both terms, digital literacy and computer literacy, have been used interchangeably in literature. However, it is critical to this study to emphasize the key differences between computer literacy and digital literacy. Digital literacy's core characteristic is the ability to communicate or find information on digital platforms (i.e., internet browsers, and online platforms). Comparatively, computer literacy focuses primarily on the level of knowledge and basic understanding and operation of computer technology. In some cases, because the more recent literature refers to a broader definition than of the earlier definitions of computer literacy that

integrate information and digital technology with diverse online contexts and competencies, there were references to both terms in the literature review and subsequent sections.

Academic literature has established that the incorporation of computing technology into our lives has had a significant impact on Information Literacy courses. Initially, these courses were designed to help individuals arrange and exhibit data using standard PC tools like word processing and presentation software. However, with the rise of internet-based information sources, Information Literacy has adapted to include these resources. While Computer Literacy and Information Literacy remain separate concepts, they are starting to merge (Hoffman & Blake, 2003). There is a growing body of research on the level of digital literacy skills of community college students. Riel and Christian's (2012) review of the literature found that Paul Gilster first mentioned the notion of "digital literacy," and the research defines digital literacy as the ability to efficiently and accurately use digital information technologies and the information retrieved from them in a variety of contexts, such as academic, career, or daily life (Riel & Christian, 2012). The Community College Research Center (2011) at Columbia University and similar studies found that many community college students have limited computer skills and lack proficiency in basic computer applications such as word processing and spreadsheet creation. Reviewing this work with both a broad and narrow lens suggests that the field might benefit from reemphasizing a solid foundation and framework from which digital literacy is rooted and grounded. Boechler et al. (2014) show a wide range of disagreement as to what specific skills, knowledge, and understandings stem from the broader term of digital literacy. Shifting away from basic computer literacy as a foundation to digital literacy and information literacy too quickly influences a significant difference in the experiences of learners and educators in community colleges. While digital and information literacy have become the leading concepts that drive technology

education, neglecting basic computer literacy can lead to significant challenges for community college students.

Guy and Lownes-Jackson's (2010) study defines computer literacy as "an understanding of computer characteristics, capabilities, and applications, and an ability to implement this knowledge in the skillful, productive use of computer applications suitable to individual roles in society" (p. 285). Their findings also show that earlier research suggested that many college students and graduates lacked computer literacy skills (Guy & Lownes-Jackson, 2010). Vance and Hoffman (2005) described computer literacy as being familiar with operating systems, hardware configurations, and desktop applications. Gupta (2006) defines computer literacy in work and academic contexts. In the work environment, it is defined as an individual's ability to operate computer hardware (i.e., personal desktop computer or laptop); understand what an operating system is; how to perform tasks such as copy, delete, open; use software; browse the web; have a basic understanding of the operating system to save, copy, delete, open, and print documents; use Web browsers; and communicate with others via email (Gupta, 2006). In academia, a computer-literate student should be able to apply the knowledge of computer technology to do research and perform tasks related to their major discipline (Gupta, 2006). For individuals without a basic level of the fundamentals of understanding of computer literacy, there are arguments that the lack of basic computer skills increases the difficulty in obtaining employment and staying connected with the local and global society than those who have at least a basic level of computer literacy skills. Also, the literature shows that employers prefer workers who are computer literate to those who are not by making the worker more efficient and productive, thus more valuable (Bell, 2021; Gupta, 2006). The element that threads the definitions together is having a fundamental

understanding of how to operate a computer and extending into the additional components, which offers consistency across definitions that can be applied to the community college curriculum.

Mansfield (2017) suggested that computer literacy is based on perception. Nixon (2013 as cited in Mansfield, 2017) indicated that students who thought they were computer literate were unsuccessful when it came to office/desktop software skills but could increase their skills with emailing and other online tutorials with support. Mansfield (2017) discovered that although "some students perceive themselves to be tech savvy, their abilities to work on a spreadsheet, copy/cut/paste and format a Word or Google Doc, copy/save/upload files, use the email system, or navigate an online college infrastructure (LMS) are lacking" (pp. 20-21).

Prioritizing the importance of basic computer skills is critical as the evolution of definitions and terminology continues to reflect the changing needs of the digital age and the importance of having a wide-range of skills in order to thrive in a world that is increasingly dependent on technology. Basic computer literacy is still essential for many entry-level jobs and educational programs. In many industries, basic computer skills are a requirement for employment, and in education, students are often expected to use computers and digital tools for assignments and research. Basic computer literacy can help individuals be successful in their careers and academic pursuits. Students with basic computer literacy skills can benefit from computer-supported learning more than those without. The use of technology in learning can assist in creating a society that values education by providing access to a vast amount of information and resources. Additionally, computer-supported learning enables students to actively engage in real-world learning experiences and collaborate with their peers. By utilizing computer-supported learning, students are not limited by the restrictions of time and location, and this presents new opportunities and challenges (Regalado, 2010). With the increasing integration of

technology in learning modalities and the reliance on the Internet for research and communication, students need to have a strong foundation in computer skills.

Graham (2021) highlighted that there was evidence of problems in the community colleges investing adequate funding to support non-traditional students use of technology. Graham believed students must also be familiar with digital tools like learning management systems and online collaboration platforms, and are becoming increasingly common in classrooms. These tools allow students to access and submit assignments, communicate with classmates and teachers, and participate in online discussions. Students who struggle with computer skills may have trouble completing assignments that must be completed using computers, requiring students to use digital tools such as word processors and spreadsheets (Graham, 2021). Students unfamiliar with these tools may need help to complete these assignments, leading to lower grades and a lack of understanding of the material (Graham, 2021).

Inequity in computer literacy is a problem that still exists in the United States and around the world. Students who need access to affordable or reliable computers limit their ability to engage fully in the digital economy. Prior research by Katsinas and Moeck (2002) reported that people living in rural areas, inner cities, and poverty most often lacked computer equipment and access to the Internet. Meanwhile, those with access to computers may lack the skills to use them effectively. The barriers to access for marginalized communities are created by systemic practices that continue to create disadvantaged marginalized populations at the local, state, and national levels. There are visible and invisible barriers that are in place to discourage or block entry to access technology and information. High school graduates from marginalized populations who are entering community colleges have fewer opportunities to be adequately prepared to contribute to the world around them. This can be due to lack of exposure, barriers to accessing resources, and

difficulty accessing environments created for students to learn, exercise, and apply practical and critical skills. The conversation around equity and debate regarding the ongoing digital divide is due to very different reasons. The digital divide (or gap) refers to the disparities in access to computer technology between demographics or regions of groups. The primary need is not for integrating technology in schools but for the inequity of access at students' homes.

The International Computer and Information Literacy Study (2018) indicated that 8th-grade students with more computers available in the home performed better with computer and information literacy and computational thinking than their peers with fewer home computers. White and Asian students also had higher average scores in both these areas than Black, Hispanic, Native Hawaiian/Pacific Islander, American Indian/Alaska Native students, and students of two or more races. Similar differences were based on school poverty levels and student socioeconomic status (Sargrad, 2020). In a study discussing equity issues, Patterson (2009) describes how vital information literacy is to community college students identified as politically and economically marginalized. Patterson also emphasized in his study that marginalized community college students had the most to gain from theories that use sociocultural frameworks to view literacy as a practice rather than a set of skills. Although fundamentally complex and creative, the expanded definition and scope contribute to the student's educational equity by asserting their capacity as authorities and creators of information (Patterson, 2009).

The Problem

After interacting with both students and instructors within the higher education setting for more than twenty years, my observance of computer literacy or even basic or foundational computer skills has spanned from poor to advanced. Additionally, this study was inspired by my experiences helping instructors during the COVID-19 pandemic to identify strategies to integrate

technology more effectively in their classes (in-person and online). I developed training sessions that integrated technology tools and applications, and we regularly utilized a learning management system, desktop/laptop computer devices, and so on. Therefore, I have seen firsthand the struggles that instructors experienced and the gaps between institutional expectations or assumptions and their realities. I also heard many stories of students who struggle with using technology in their classes. I hope that this research will help inform community college practices and strategies to explore early-stage assessments and support structures so that both instructors and students can optimize their learning opportunities and truly realize the goals that initially led them to the community college.

Requests from faculty for technical support ranged from how to navigate to various functions on a desktop computer to navigating user interfaces on the college's learning management system (LMS). Reports from faculty indicated that their students struggle to complete assignments due to their inability to use word processing programs such as Microsoft Word, Excel, or PowerPoint. After many years of interactions with faculty and students in this capacity, the deduction was made that this may be a sign of a problem that is either ignored, viewed as a low priority, or has been replaced by digital literacy initiatives. Cox (2009), a member of the Academic Senate for Community Colleges in California, said the following that shares a core perspective that was a thread throughout this study:

> As a system, we can't afford to overlook computer skills and assume that locally-imposed information competency requirements will magically lift students across this "digital divide." While information competency is a critically important skill for students, teaching information competency presupposes that students have the ability to use computers well enough to focus on critical thinking and evaluation of the material they find. (p. 1)

This is an issue that can have short-term and longer-term impacts, thus, “institutions of higher education cannot assume that all students arrive at colleges and universities with the technical skills needed to be effective [learners]” (Stafford & Stinton, 2016 as cited in Graham, 2021, p. 2). College administrators may assume that community college students and instructors have sufficient computer skills and computer literacy to navigate and utilize technology, but the assumptions may be inaccurate. This assumption can lead to a lack of resources and support for individuals who require additional training and resources to succeed in the digital age. The literature on this topic suggests that there is a need to explore the lived experiences of students and instructors to gain a more accurate understanding of how the assumptions align with their actual skills. Technology integration in the teaching and learning process has evolved, and so has the role of the instructors. The instructor’s computer literacy contributes to their ability to support students in using technology to complete their coursework "Technology has become an integral component across various dimensions of education”, as highlighted by Graham (2017, para. 2), underscoring the imperative to focus on enhancing instructors' proficiency in computer and technology skills. The “marriage between technology and education, dramatic improvements in effectiveness and efficiency can only be realized when colleges move beyond the maintenance of expected technology and toward the next big disruptive innovation in the field” (Graham, 2017, para. 3). Equipping instructors as well as students with a solid foundation in basic computer skills lays the groundwork to prepare them to thrive in an evolving digital landscape of advanced technologies.

This study takes a deep dive into the problems that are presented as a localized problem that may also represent a national problem. This research study aims to understand and explore whether community college administrators make accurate assumptions about the foundational or

basic computer literacy skills of incoming students and community college instructors. In addition, community college instructors make assumptions about the academic preparedness and computer skills of their students that may not match their actual capabilities. To hold this position and serve its students, the two-year institution must develop strategies that command success in all facets of institutional technology integration. The lack of computer skills and computer literacy among community college students and instructors is a significant issue that can hinder academic achievement and cause greater difficulty in online and remote learning environments, and professional development (Hoffman & Blake, 2003). Despite efforts to incorporate technology in higher education, many community college students and instructors still struggle with basic computer skills, which can affect their ability to access and use educational resources effectively. The limited computer skills and computer literacy of community college students and instructors have been reported as a barrier to their success in college and the workplace.

The Research Questions

This study will explore and investigate this problem by asking three research questions (RQ):

RQ 1: What are the common assumptions made by community college administrators about the computer literacy skills of students and instructors?

RQ 2: How accurate are these assumptions in reflecting the actual computer literacy skills of students and instructors?

RQ 3: How do community college students experience computer technology in the educational setting and their personal life?

The existing research explores the challenges that community college students and instructors face in terms of their computer skills and computer literacy. Studies have explored the

factors contributing to this issue, including socioeconomic status, lack of access to technology, and inadequate technology training. While some studies have proposed solutions to address these challenges, the effectiveness of these interventions has not been widely evaluated. Another significant goal of this study is to build on the existing research by examining the assumptions of computer skills and computer literacy among community college administrators and their impact on community college students and instructors. The most recent research works with literature that focuses on digital and information literacy definitions. This research study is a result of the belief that it is worth going back to see if the early work still holds in its focus on computer literacy as the fundamental skill that strongly influences the successful utilization of digital and information literacy in academic and professional settings.

An aim of this study is to play a pivotal role in providing a compelling argument to reintroduce the importance of basic computer literacy skills in community colleges. First, by providing post-secondary and community college administrators with a deeper level of understanding of prior and existing computer technology experiences of their students and instructors. By having a deeper understanding, administrators will be better able to identify potential barriers to using technology, more accurately and effectively allocate resources for technology support, and result in evidence-based recommendations for developing a process that informs an accurate understanding of the computer literacy of their community college students and instructors. The study will also identify the factors that affect the adoption of technology by community college students and instructors and explore potential barriers to the implementation of a comprehensive computer literacy program. Finally, this study will provide evidence-based recommendations for developing a process that informs an accurate understanding of the computer literacy of community college students and instructors. The study's findings will have

practical implications for community college administrators and instructors seeking to enhance technology integration in teaching practices and technology support systems and apply a better-informed lens toward more equitable practices.

There are lessons learned from the experiences during the COVID-19 pandemic era (beginning early 2020), and prior research suggests that the "digital divide is alive and well on the community college campuses" (Appel & Tarker, 2011, p. 6). These research questions for this study will provide a deeper understanding of those lessons. For instance, students who were computer literate and had higher computer self-efficacy performed better during the shift to remote learning than students with lower skill levels using technology devices or familiarity with hardware or software associated with online learning (Li, 2022). The need to improve the technological and computer skills of both students and instructors reemerged during the pandemic, but the sudden shift to an online setting during the pandemic presented a short timeframe to address the issue. While the shift to online and remote learning increased opportunities for students with lower computer literacy skills to improve their technical knowledge, there was little time for students or instructors unfamiliar with online or remote learning to adapt or get accustomed to the new setting which may have resulted in lower overall performance in their course(s) (Li, 2022). Is the experience with technology disproportionately different for one student population than others? Appel and Tarker (2011) found that a higher instance of the need for basic computer skills tutoring was among non-traditional students and students with English as a second language (ESL). These are just a few ways the research questions provide an opportunity to make more meaningful connections to the literature.

The Methodology

The following section will lay out the design principles that were used to collect data to answer the three research questions that guided this study.

Research Design

A mixed-method approach is employed in this study and utilizes a sequential explanatory design. This mixed method approach integrates quantitative and qualitative methods to allow for a more robust analysis that takes advantage of the strengths of each (Ivankova et al., 2006) that could not be achieved with what quantitative or qualitative methods capture alone. It goes beyond the limitations of using either approach in isolation by leveraging the strengths of both. This approach not only offers additional evidence for studying the problem but also allows researchers to uncover insights that transcend the sum of its quantitative and qualitative components (Creswell & Plano Clark, 2017). Furthermore, mixed methods research enriches the research process by creating synergy among the strengths of each approach, resulting in a deeper and more nuanced exploration of the research problem or phenomenon.

A sequential explanatory mixed-method design consists of two phases. During the analysis of Phase I, quantitative data informed development of the follow-up interview structure and development of qualitative instruments. Analysis and results for each phase were performed and presented independently, and connections were interpreted to "offer the strength of confirmatory (or opposing) results drawn from quantitative multivariate analysis" (Castro et.al., 2010, p. 342).

Sampling. A purposive sampling strategy was employed in this research. The timing of the summer academic term at the time of the study posed a challenge in identifying the target population for this study. To circumvent these issues, the population for this study was limited to the community colleges closest in proximity to the location of the researcher.

Phase I. Samples in Phase I were selected from three populations. The first consisted of Departmental Directors, Chairs, Associate Deans, Deans, Vice Presidents, and President (referred to as Administrators hereafter) of the community college. An email listserv containing email addresses of the full-time administrators employed at the host institution for the research was used in the initial recruitment for participants. The second sample was a subset of the current enrolled students in the subject institution as a new student or continuing student. The sample size for the student data depended upon the class size of the summer courses to which the researcher was given access and was taken into consideration prior to the study. The estimated sample size was made based on access to a smaller number of course offerings and smaller class size during the summer term.

Phase II. Respondents of the Administrator Survey from Phase I were given the opportunity to volunteer for participation in Phase II. The participants in the qualitative phase were a subgroup of the Phase I subjects, forming a smaller sample size (n = 23). Student participants were given the option to produce a digital (visual) storytelling project either independently, collaboratively with other participants, or in partnership with the researcher. Based on low response rates during the recruitment phase, the original population of first-year enrolled students was expanded to all enrolled students.

Instrumentation

This study employed three instruments: (1) An online survey, (2) Northstar Digital Literacy skills assessments, and (3) An interview protocol. An online administrator survey was administered in phase I which included 5-point Likert questions, and open-ended questions utilizing the survey tool Qualtrics. Employing online survey instruments in academic research

provides several benefits when transferring data to Statistical Package for the Social Science (SPSS), an advanced analysis software, thus enhancing data reliability by reducing manual errors.

Phase II. In the qualitative phase of the study, follow-up interviews were conducted with administrator volunteers, and these interviews followed a protocol developed based on preliminary Phase I data. Participants had previously provided online consent in Phase I, and they received a copy of the interview questions prior to the interview, which aimed to stimulate reflective thoughts. These interviews were conducted via Zoom and began with an introduction to the study's purpose and objectives, including a reminder to consent to video and audio recording. A summary of preliminary quantitative results was presented to the interview participants, followed by probing questions presented on the screen, allowing participants to respond freely. In addition to interviews, Phase II also included open-ended survey questions completed by both administrators and instructors using the Qualtrics survey tool.

Data Collection

Data collection for the study took place during the summer academic term beginning in June 2023 and concluded early in September 2023. Data for this study includes online surveys responses, Northstar digital literacy assessment scores, digitally recorded videos, audio recordings, still images, and transcripts of Zoom interviews with each of the three samples.

Phase I. An online survey was sent to administrators via email in early June 2023, with a follow-up email sent in the final three weeks to boost response rates. Participants were encouraged to reflect on their technology experiences and challenges, followed by the creation of visual products using various art forms. Subsequently, interviews were conducted to decode the meanings behind these visual products. These interviews were audio-recorded and transcribed for analysis.

Phase II. Phase II aimed to deepen understanding, focusing on administrator assumptions, instructor experiences and assumptions, and participants' experiences in the digital realm. Digital storytelling was initiated in collaboration with instructors, providing participants with an overview of the study and digital storytelling concepts. Participation was voluntary, and participants could choose to work independently, collaboratively, or with the researcher. Equipment and training were provided to ensure equitable access.

Data Analysis

Phase I data analysis procedures involved a sequential explanatory mixed-method design. Phase I quantitative data were analyzed descriptively using SPSS. A coding and thematic analysis during Phase II examined open-ended survey responses and interview transcripts using the Atlas.ti software program.

Chapter 2: Theoretical Framework

Building on the context presented in the introduction, the theoretical framework helped contextualize the research questions and research design for this study. The theoretical framework provided a lens through which to analyze the data and draw meaningful conclusions. This study was founded upon the conceptual framework of pragmatic constructivism. Pragmatic Constructivism recognized the importance of both the learner taking an active role in constructing their understanding and the practical application of knowledge produced (Gordon, 2009). In the context of this study, a constructivist lens allows for the exploration of computer technology skills and cognitive, social, and environmental ways of learning. Gordon (2009) discussed that pragmatism emphasizes the practical application of knowledge and the importance of considering the context and consequences of actions. This study will aim to gain perspectives that have important implications for teaching and learning and offer valuable insights into how to promote effective and meaningful learning experiences. Pragmatic constructivism weaves together the meaning-making of knowledge and action, and Reich (2009) references Dewey when she explains that "Constructivism, like Pragmatism, does not plead for constructions for the sake of constructions, but looks for solutions to problems of human import based on the cultural resources at our disposal" (p. 63).

Ways of knowing, understanding, and learning are not linear or one-dimensional. The constructivist framework relies on its ability to maintain the stance that knowledge is not universal and is relative, subjective, and interactive. The positivist paradigm contrasts with both constructivism and pragmatism. Schwandt (2001, as cited in Lincoln & Guba, 2013) credits the term positivism to the French philosopher Comte and defined it as a form of blind realism (ontology) that believes that our minds do not influence reality, or the external world and the

many parts can be studied independently. However, there are no absolutes with constructivist views of what is reality. In contrast, reality is socially constructed and created by interactions within a social environment, and social community or cultural context. A related theoretical paradigm is interpretivism. Lincoln and Guba (2013) argue that the interpretivist way of learning that challenges previous ways of knowing by creating more questions than answers. What distinguishes the positivist view from a constructivist view is the notion that knowledge isn't generalizable or considered a universal truth, but knowledge has perspective variability and interpretations are based on the experience of individuals and/or communities (Lincoln & Guba, 2013). When discussing reality, knowledge, and truth, sociology is largely dependent on the consensus of agreement among a community or group. Learners use their lived experience and bring their existing knowledge of language to construct and build understanding and knowledge. Learning to understand and construct knowledge go hand in hand (Schwartz, 2019). The main obstacle to relating pragmatic constructivist ideas to contemporary controversies in moral theory is that pragmatists, "like Dewey, reject many of the core assumptions that underlie the entire problem" (Schwartz, 2019, p. 126). Pragmatic constructivists argue that it is not possible to give a substantive account of the supposed dualisms of reason and desire, thought and action, is and ought, means and ends, the individual and society, and more, that provide the pivots around which current battles are fought (Schwartz, 2016).

Key Principles and Assumptions

Constructivism has been the dominant theory of the last decade and supports the construction of knowledge by the individual (Karagiorgi & Symeou, 2005). According to Bellefeuille et al. (2009), "Constructivist learning is determined by the complex interplay among learners' existing knowledge, the social context, and the problem to be solved" (p. 64).

Constructivist elements are largely based on the knowledge that is constructed by experiences. Pragmatism focuses on a research approach that is not based upon theory, but instead on how experience shapes knowledge, and how it guides action and practical applications to real-world problems (Tam, 2000). Pragmatism and constructivism shared epistemological underpinnings tie directly to participatory visual research at its core. The key assumption of pragmatic constructivism is the synergy between theory and practice. Procter (2019) states that theory and practice cannot be separated, just as learning, and teaching also cannot be separated. Contributions in the work of a constructivist cannot be discussed without also referring to practice, and for the social constructivist, this means going further and discussing the role of the stakeholders.

This study values emphasis not only on the individual human experience but also on the shared human experience. Reich (2009) wrote, "Problems must be examined in the cultural context of thought acquired in education. It is best developed out of experienced activities in which we learn something about ourselves and our world" (p. 60). This study has the potential to bring attention to an increasingly prevalent issue across the community college systems. Computer literacy (or the lack thereof) can be the difference between a smooth experience in community college and a frustrating one. Individuals who are computer literate, which might include typing or using word processing applications and understanding of how to operate a desktop computer system, are considered more employable and provide pathways to the access of resources. Computer literacy acute awareness in Oregon was minimal at best prior to the increase in attention given to it after the start of the pandemic, and there appears to be some interest from educational system leaders in addressing the problem. This research study's findings will give a visual glimpse into the lived experiences of its community college students that may inform

practices within the community and ones like it. Constructivism and pragmatism as a framework are key to this study because it shares a perspective that deviates from a common approach of the objectivist models of learning, and instead guides research toward the construction of knowledge. As Bellefeuille (2009) states, in order to understand these perspectives, "important questions are asked to explore the learning process, how learning happens, the distinction between the primary role of the teacher and the learner, what can the teacher do to carry out that role" (p. 63).

Understanding Computer Literacy with a Pragmatic Constructivist Lens

The ideas and concepts that will emerge may become the building blocks to the development of an educational toolbox of related, interconnected, or interdependent findings of how constructivism and pragmatism can be the lens through computer literacy that is addressed in educational systems and practice. It is not the intention or purpose of this study to generalize about any one community of learners or teachers, but rather to highlight and provide a mechanism by which voices are magnified in an authentic way and that is deeply embedded in the participants' lived experience in ways traditional qualitative only or quantitative only research approaches are unable to do. The findings of the study may reveal and produce knowledge about the ways in which social interactions in communities shape the development of one skill over another. A major strength of pragmatic constructivism as a framework for this study is the ability of the social construction of reality to guide the actions of learners and the community in which they work and live.

Review of the Literature

History of Computer Literacy

Boechler et al. (2014) found that the first article on computer literacy was published in the late 1970s with the use of the term peaking in the mid 1980s, followed by a steady decline until

the late 1990s. Computer literacy was traditionally defined as the ability to use tools to manipulate data and write small codes (Leahy & Dolan, 2010 as cited in Boechler et al., 2014). When computer literacy emerged as a hot topic in the 1980s, basic computing tasks were considered integral aspects of computer know-how (Etherington, 2018). The first reference to computer literacy can be found in a New York Times article comparing the interest in reading literacy in the 1970s to the then-emerging importance of computer literacy in the 1980s (Etherington, 2018). The assessment of a student's ability to use computers should be a central tenet of educational computing research, but until now, most studies have relied on vague and imprecise definitions of what constitutes being able to use a computer (Selwyn, 1997). The article's use of the term computer literacy was sparked by Andrew Molnar, who is credited for first introducing the concept in 1978. Molnar, who was working at the National Science Foundation, played a critical role in helping the office establish a strategic national vision for technological change (Etherington, 2018). Within 10 years from 1978 to 1988, over 155 articles focused on computer literacy were published. Decades later, as access to computer technology became more accessible and sophisticated, so did the language and terminology reference the use and application. The concept of computer literacy has evolved into more than basic computing tasks, such as word processing or email, as forms of literacy. By the 2000s, new terms such as media literacy, digital literacy, and information literacy were introduced in research and publications.

An article in the Journal of Higher Education published in 1985 defined computer literacy as "that compendium of knowledge and skill which ordinary, educated people need to have about computers to function effectively at work and in their private lives in American society" (Etherington, 2018, para. 6). The article also emphasized several key skills that are part of this

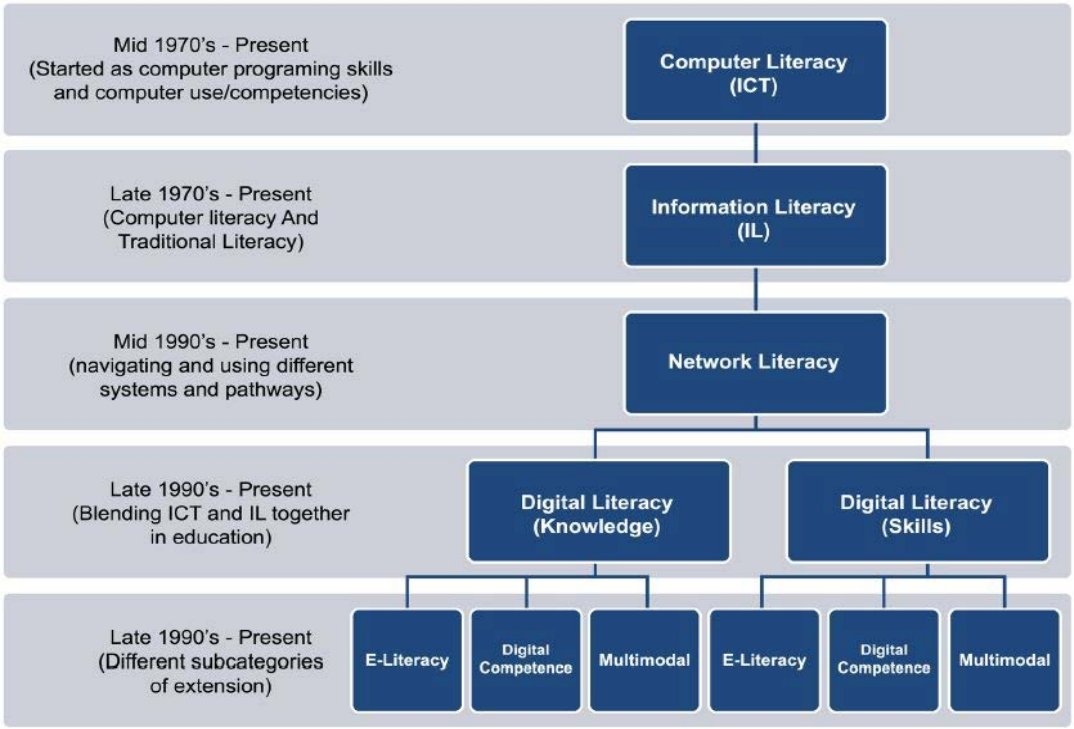
new literacy, including word processing, the ability to use spreadsheet programs, and the ability to use a computer to retrieve and share information. Creighton et al. (2006) asks very critical questions when it comes to the computer literacy of students, such as: are new freshman students already computer literate? Community colleges with a better understanding of the computer skills of their students are better able to identify and dedicate the resources to provide students with access to computers and the latest digital tools. Providing a foundation in basic computer literacy can help ensure that students have the necessary skills to use the digital tools and resources that are available to them.

Boechler et al. (2014) shared findings from literature that showed the differences in definitions and terminology (See Figure 1). One definition explains computer literacy as "an understanding of computer characteristics, capabilities and application, and an ability to implement this knowledge in the skillful and productive use of computer application" (Ferrari et al., 2012, as cited in Boechler, 2014, p. 81). When computers were less common in everyday life, computer literacy was defined as being able to write computer programs. This definition now has moved away from specific computer skills and towards a more general understanding of being able to use computer applications to solve everyday problems (Bartholomew, 2004). Computer technology skills were perceived as a critical skill when computer literacy first emerged in education, and it remains critical to maintaining a foundation in basic computer literacy in community college education. Community college students and instructors have a solid foundation in basic computer skills before moving on to more advanced digital and information literacy concepts. Computer literacy was initially used to describe the ability to use and understand computer technology. It focused on the technical skills required to operate and navigate computers, including the ability to navigate a desktop interface, use basic software

programs, and troubleshoot common problems. This includes understanding the basics of computer hardware, software, and operating systems. Without this foundational knowledge, it can be difficult to use other digital tools and platforms effectively. However, as technology has become more advanced and ubiquitous, the concept of computer literacy has evolved to include a broader range of skills.

Figure 1

Evolution of Digital Literacy Terminology



Note. Reprinted from *Digital Literacy Concepts and Definitions* in International Journal of Digital Literacy and Digital Competence (5(4), p. 3), by Boechler, P., Dragon, K., and Wasniewski, E., 2014. Copywrite by IGI Global 2023. Reprinted with permission (see Appendix A).

The Evolution of Computer and Digital Literacy Terminology

An examination of terminology in literature shows that the "terms and concepts related to digital literacy have emerged from prior conceptualizations and terms such as computer literacy,

information literacy, and network literacy" (Boechler, 2014, p. 2). Boechler (2014) presents information literacy as being originally stemmed from the field of library and information studies and suggests that it is conceived as the set of literacies or competencies that an informed citizen needs to participate judiciously and actively in the information society. In recent years, the terms digital literacy and information literacy have gained prominence as new ways of thinking about the skills required to navigate the digital world. Digital literacy goes beyond computer literacy to encompass the skills needed to navigate and understand the digital landscape. It includes the ability to use digital tools to communicate, create, and collaborate, and the ability to critically evaluate digital content and protect personal data online. Information literacy is another related concept that emphasizes the ability to find, evaluate, and use information effectively. It includes skills such as understanding how to search for information using online databases and search engines, critically evaluating sources to determine their reliability and relevance, and synthesizing information from multiple sources.

The shift towards digital and information literacy reflects the changing nature of digital discourse. Technology evolves at a rapid pace, and as new technology, digital tools, and platforms emerge, it is increasingly important for individuals to have the confidence, skills, and knowledge needed to navigate it effectively. The ability to think critically, evaluate information, and adapt to new technologies is essential in today's digital world. Basic computer literacy is still an important foundation, even in the era of digital and information literacy. The perspective that computer literacy is still an important concept but is now just one component of the broader digital and information literacy landscape can lead to assumptions of an overall technology skill level that can have long-lasting effects on community college students.

Community colleges play a crucial role in providing access to higher education for a diverse student population. With the increasing integration of technology in education, it is essential to understand the level of computer skills and computer literacy among community college students and instructors. Additionally, it is crucial to examine the assumptions made by college administrators regarding technology skills to identify potential disparities and address any gaps in technical proficiency.

There has been an evolution and shift from computer literacy to digital, information literacy computer literacy in research focused on community college students and instructors. A study by Li (2022) found that community college students had low levels of computer skills and computer literacy, particularly in the areas of computer navigation and learning management systems. Similarly, a study by Washington et al. (2020) found that community college instructors lacked the necessary skills to effectively integrate technology into their teaching.

There is not a wide representation of research that also highlights the assumptions made by college administrators regarding technology proficiency. A study by Mishra and Koehler (2006) found that administrators often assumed that instructors had the necessary technical skills, leading to inadequate training and support for technology integration. A study by Roswell et al. (2017) found that administrators assumed that all students had equal access to technology and did not adequately address the technological needs of students from low-income backgrounds.

Did the Evolution of Terminology Shift Too Far?

The emphasis on hardware, devices, computer systems and software has advanced over the decades; however, there remains a core element of basic computer operations and fundamental understanding that is necessary to be effective and confidently employ the more recent definitions of digital and information literacy. Childers (2003) reminds us that the concept of computer

literacy is not new and the terminology, as discussed earlier, has changed over time. Regardless of the name or term used, "the concept of computer literacy still has merit. By looking at the history of the computer literacy movement for grounding, we can build a definition for the next century and affirm that learning computer basics is a good thing" (Childers, 2003, p. 100). College leaders and educators "need to be thinking about how to teach both Legacy and Future content in the language of the Digital Natives" (Prensky, 2001, p. 4). The ongoing challenges related to the level of computer technology literacy post-secondary education are worth exploring further due to the notion that the focus has shifted too quickly from the later definitions of computer literacy. Gardner and Stotts (2022) stated that online classes have the inherent advantage of helping students develop important computer skills and a learning mindset that are crucial for success in the 21st century. Additionally, results of the Gardner and Stotts (2022) study showed that many students, especially those who are older or English as a Second Language (ESL) learners, lack basic computer proficiency and are often hesitant to learn on their own. However, remote classes provide a safe and encouraging environment that incentivizes students to improve their areas of weakness. The study used Zoom [video conference] classes, for example, to help students develop typing skills as they used the chat feature and became more familiar with navigating apps and computer settings by sharing their screens and using breakout rooms. By using a computer and improving their skills, students learned to be comfortable with not knowing, exploring, and constantly learning, which enhanced their potential job skills, confidence, and employability (Gardner & Stotts, 2022).

Although many institutions treated remote learning as a temporary measure during the COVID-19 outbreak, the Adult Basic Education/Adult Secondary Education (ABE/ASE) program at Southeast Community College (SCC) in Lincoln, Nebraska, found that remote learning

provided enhanced learning opportunities to both instructors and students (Gardner & Stotts, 2022). Data collected in the Gardner and Stotts (2022) study showed that remote classes, which included Zoom classes and distance learning, continued to be in demand even after classes returned in person. Additionally, remote classes outperformed in-person classes in terms of students' gains in reading, math, and high school equivalency. The instructional changes during the pandemic at SCC showed that remote classes are viable, advantageous for students, and increased accessibility as they continued to be offered alongside traditional classes.

The literature review Graham (2021) conducted for their study showed a group of students who warrant a deeper dive into their computer technology abilities. Graham found that for many colleges and universities in the US, there has been a rise in the number of nontraditional students enrolling in classes at the local community college (Graham, 2021). The research also revealed that some of these nontraditional students lack information literacy and the ability to use information resources and technology to develop necessary skills for completing assignments and solving problems (Chen & Xu, 2016). As a result, nontraditional students often begin their college education without the required technology skills, which can hinder their academic progress. The issue at the small community college in the Southern United States is that instructors are not providing adequate support for nontraditional students to use technology, which may leave them unprepared to complete coursework. To succeed in these higher education institutions, nontraditional students who enroll in them must possess the necessary technological skills. According to a counselor at a community college's student success center, some nontraditional students may lack the skills required to utilize the college's learning management system. Understanding basic computer hardware and software navigation is useful in utilizing learning

management systems. Chen and Xu's (2006) findings show evidence of shifting from computer literacy too quickly.

Computer Skills of Community College Students

According to Mansfield (2017), the ability to use the learning management system (LMS) and basic computer skills are essential for first-year experience (FYE) courses, but some students lack these basic skills. To compare instructors' perceptions of the computer literacy skill levels required for FYE student success with FYE students' self-reported current computer skill levels, a survey was conducted at a large Midwestern community college. A total of 368 first-year students and 47 first-year instructors participated in the study. An independent-samples t test was used to determine whether the mean basic computer skills of the two groups (FYE instructors and FYE students) were significantly different from each other. The study's results prompted a recommendation to modify the student entrance policy by introducing computer literacy workshops and placement exams for students.

There is evidence that students entering community college enroll lacking skills. Graham's (2021) research "identified four overarching themes reported by community college students: (a) insufficient basic computer skills, (b) need for support for nontraditional students, (c) lack of internet access, and (d) unfamiliarity with the college's learning management system" (p. 93)**.** Regarding the first research question, numerous responses emphasized the deficiency of fundamental computer skills among students. These problems included a variety of issues, such as the inability to power on a computer and being unfamiliar with the learning management system of the college, which hindered students' ability to access or submit assignments.

Dalal et al. (2022) conducted a study to examine first-year college students' preparation for college-level research. The study focused on challenges that students faced finding and using

information for their course-related research and the gaps that exist between what they learned in high school and the expectations once entering college. Participants in the study were given a 64-question survey that collected demographic, descriptive, and open-ended questions which were informed by previous information literacy studies (Dalal et al., 2022). The survey was intended only for first-year college students who were recent high school graduates (ages 18–20). It was distributed to first-year students on the author's six college campuses, and alumni over the age of 18 who graduated from high school.

Prensky (2013) identified that there is now a diverse group of students who are digital natives (students who grew up with technology) and digital immigrants (those who did not use or scarcely used technology during childhood) who need computer literacy skills in face-to-face classrooms (Prensky, 2013). These groups, although similar, have very different experiences with technology as children, therefore needing further investigation as to how to better serve them in postsecondary learning environments, especially in community colleges.

The findings in the literature by Graham (2021) suggest that nontraditional community college students' experience with computer technology is significantly different from those of traditional students. Graham's (2021) study also found that "nontraditional students need help not only in learning course material, but also in learning to use technology" (p. 8). The study also found that the inadequate technology skills of nontraditional students enrolling in a state-funded community college in the Southern United States, coupled with the lack of support from certain instructors, led to concerns from college administrators and instructors. The college in question is one of fifteen state-funded community colleges and has seen a rise in the number of non-traditional students. To address this, the college in this study created the Nontraditional Student Success Center, which provided a space for nontraditional students to meet and study with peers.

Li (2022) shows that the ability of students to be prepared and proficient in digital learning is a significant challenge in online education. While some students may possess the necessary knowledge and skills in using technology and the internet, others may lack proficiency. In online courses, students with higher self-efficacy in using computers, the internet, and online communication tend to perform better than those with lower digital skills. This also applies to teachers, faculty, and staff. Being familiar with online learning hardware and software may not always result in better comprehension and satisfaction for students. Although there is room for improvement in both students' and teachers' digital skills, the sudden shift to online learning during the pandemic has limited the opportunity for adequate training and improvement.

The study conducted by Hoffman and Blake (2003) raises an important and significant finding. Their findings indicate that informal learning is increasingly becoming the predominant mode for acquiring computing skills and that students develop their technological literacy in one of two pathways: by formal methods such as school programs or the workplace, and informal methods, which include self-directed learning, learning from friends, and learning at home. Their research found that formal computer education often provides training in areas such as creating and maintaining presentation files, engaging in online discussions, or creating and managing websites. In contrast, informal learning takes place as students use technology to share their personal interests.

Hoffman and Blake (2003) raised the question of whether informal instruction is more effective than formal instruction and whether students are more likely to learn about technology if it is related to their lives. Will informal learning increasingly become the primary means of learning about technology (Hoffman & Blake, 2003)? This trend benefits from a methodological approach that is structured to collect both the informal and formal aspects of the participants'

formal and informal technology experience. This can be done most effectively through participatory visual research "that asks research participants (or subjects) to develop visuals – drawings, photographs, murals or videos – as part of the research process" (Lorenz & Kolb, 2009, p. 263). Data in the form of visuals produced by consumers can be unexpected and reveal issues and strengths within the organization that may not be captured through alternative data collection methods (Lorenz & Kolb, 2009). Data in the form of video is anticipated to be incorporated throughout this study as digital storytelling or self-documentary style with the participants directing and filming their own content.

One of the crucial practices in the field of learning sciences is to include envisioning, designing, accomplishing, sharing, and widely distributing technological boundary objects that aid collaborative research using video records as important elements in the research agenda (Derry et al., 2010). Conducting video research in the learning and educational sciences are more likely to advance cumulative knowledge building if a major part of their research activity includes sharing and vetting not only their video and research findings (Derry et al., 2010). The ability to access research findings by developing a "virtual repository is a key element in collaborative research because it provides a research community with an accessible touchstone corpus of empirical materials, analyses, and tools" (Berman et al., 2003 as cited in Derry et al., 2010, p. 30).

Computer Skills of Community College Instructors

A study by Kemp et al. (2014) indicates that teachers' computer competence is a major factor that determines the merits and drawbacks of employing technology for instructional strategies. They outline the benefits and disadvantages of using technology for instructional strategies largely depend on the competency of the teacher, and that in order to utilize technology

in an educational setting in a suitable and effective manner, teachers must comprehend the purpose behind its use and should retain control of their teaching. They express concern that technology may become a substitute for teachers who lack the ability to teach, it can also serve as a reflection for teachers to objectively evaluate their teaching styles and methods both in traditional classrooms and online courses. To ensure that nontraditional students acquire the necessary technological skills to complete coursework, instructor support is crucial. The local community college instructors in Graham's (2021) study showed hesitancy in incorporating technology into their lesson plans because it is a new and unfamiliar concept to them. The study found that some instructors are not as skilled as others in using technology and consider themselves to be from the "old school" and are resistant to the idea of using technology in the classroom.

Basic Computer Skills and Non-Traditional Students

According to Graham (2021), the available literature on teaching technology to nontraditional students was extensive, but only a few articles concentrated on the support provided by community college instructors to nontraditional students in using technology. Graham found that even though most of the literature did not solely concentrate on instructional support for nontraditional students in community colleges, a significant amount of research addressed the gap between the need for nontraditional students to use technology for academic success and the instructor support available to students. The literature selected to tackle this issue focused on topics such as the impact of nontraditional students enrolling in higher education, the teaching of technology to nontraditional and traditional students, and instructor support for students. Graham's (2021) study aimed to analyze the educational assistance provided to nontraditional students when using technology to accomplish coursework and how community

college instructors assist nontraditional students in using technology for coursework, and how such support can contribute to their academic success.

A significant number of nontraditional students are enrolling in higher education institutions without possessing the necessary technology skills to succeed academically (Graham, 2021). These students are often adults who attended school when technology was not present in classrooms, making it difficult for them to cope with courses that integrate technology into the curriculum (Lowell & Morris, 2019; Robinson, 2019). Lowell and Morris (2019) brought to the forefront the underlying issues of the nontraditional student that without experience using technology in a classroom setting may struggle to learn due to limited technology knowledge and skills.

Debate on the Role of Technology in Education

Mansfield (2017) reported that beginning in 2000, the discussion began regarding new technologies and computer literacy norms in the online learning platform and the inequalities between the information wealthy and impoverished. This concept was known as the digital divide (Norris, 2001). The digital divide (or gap) refers to the disparities in access to computer technology between demographics or regions of groups. The primary need is not for the integration of technology in schools, but instead, for the inequity of access at students' homes. Kemp et al. (2014) argued that the negative aspects of technology use, specifically online discussion tools such as e-mail, discussion boards, and social networking, were criticized by some authors who argued that these instructional strategies lacked immediacy and could lead to isolated responses. Additionally, Kemp et al. (2014) was concerned that technology could be used simply for entertainment or convenience rather than enhancing the educational experience. On the other hand, proponents of using communication technology in education argued that it was important to

engage students by utilizing tools that are familiar to them. Kemp et al. shared findings from authors who found these technologies to be effective in promoting in-depth discussion, others saw them as a loss of immediacy and intimacy (Kemp et al., 2014). Opponents argued that too much reliance on technology could hinder students' ability to think independently and develop interpersonal communication skills (Kemp et al., 2014). The argument was whether technology is beneficial or not depends on how it is used and in what context, and that it should be viewed as a tool or supplement, rather than a crutch for teaching, and if used appropriately, technology can enhance learning opportunities (Kemp et al., 2014).

The attitudes of students collected in a study by Chaves et al. (2016) regarding learning, were influenced more by the teaching methods used by teachers. Although some argue that we are currently in a transitional period between two generations, digital natives and digital immigrants, the available data appears to challenge this notion. Digital natives continue to respond well to "traditional" digital strategies employed by digital immigrants, while the latter group seems to adopt new technologies with surprising ease, viewing them as means rather than ends. Chaves et al. (2016) suggested that by employing technology in the classroom, we use the possible effects of those technologies as a means of avoiding any distortions in knowledge production and social relations. He further explained that this is not a resistance to new technologies, but rather a cautious approach to avoid losing other cultural achievements such as the symbolic, denotative, subjective, musical, and non-programmable dimensions that allow us to remain autonomous, creative, and knowledgeable producers. Chaves et al. (2016) believed that we should continue to explore which technology tools are useful for teaching and how frequently they should be used in the context of learning.

College Administrator Perceptions and Assumptions

Graham (2017), a leader and member of the American Association of Community Colleges, argued that almost every aspect of education relates to technology and that students today do not consider technologies like PowerPoint, Wi-Fi, and learning management systems (LMS) as special, but rather as the fundamental platform for receiving education. Basic technologies are expected to work properly, and only get noticed when they malfunction, like air conditioning or electricity. Adam-Turner and Burnett (2018) investigated how leaders at two rural community colleges in the Southeastern United States perceive learning technology and digital literacy on their campuses, and explored how the leadership approach of transformation theory could address these concepts. The study found that the institutions have established digital learning standards and guidelines for their faculty, and that the leadership recognizes the importance of digital learning development and continuous training for both faculty and personnel in digital learning.

The current research available needs to be more extensive and focuses on evaluating the level of digital learning among rural community college personnel and the extent to which digital learning is integrated into curricula. McMillen (2010) recommends administrators to take steps towards achieving digital learning and digital learning for both faculty and students in community colleges by establishing metrics, which will allow them to remain competitive in rapidly changing technological environments. Both politicians and college leaders agree that incorporating technology into learning and teaching provides valuable data for better decision-making and performance management (McMillen, 2010). The study suggests the adoption of learning technology involves more than simply providing hardware and computer skills. Post-secondary leaders face a significant challenge in developing faculty and staff with digital literacy skills to

manage the frequent and rapid changes in technology that are designed to support both administration and teaching. These leaders should carefully consider the issues that may arise for an institution that is struggling to adapt to technological change, although “some researchers view digital competencies as computer skills and others as learning/knowledge applications” (Adam-Turner & Burnett, 2018, p. 25). Adam-Turner and Burnett (2018) provided comparative cross-reference developed by the American Association of Community Colleges (AACC) of the most current literature on dimensions, concepts, and competencies of digital learning. The table outlines the definitions of *novice* and *digital learning beginner*. Novices are individuals who have been introduced to digital awareness through their understanding of digital products like the internet, Google, social media, and mobile technology. Digital learning beginners, on the other hand, possess basic skills in human-machine interaction and can use administrative and learning technologies such as Microsoft products and simple internet applications.

Adam-Turner and Burnett (2018) also shared the framework of competencies developed by the American Association of Community Colleges (AACC) for community college leaders to help their personnel progress along the leadership continuum. The viewpoint of this study's leadership showed that high school students and younger adults are knowledgeable in technology. Therefore, instructors and administrators need to improve their level of digital technology and literacy competency to meet their students' needs. Administrators believed that all personnel had a fundamental understanding of digital technology for academic learning. The literature in this review suggests that administrators acknowledged the challenge of a student’s limited technological skills and access to reliable technology off-campus, particularly in rural and low-income areas. This could negatively impact their learning and academic achievement. To address

this issue, senior administrators emphasized the importance of all personnel understanding the implications of integrating digital learning.

The study conducted by Roby et al. (2013) obtained insights from both students and instructors about their perceptions on the online learning experience. Although the study used university data and not community college data, there is insight still to be gained by this research. The student participants reported that they were proficient in using technology, but still required access to technology support while enrolled in an online or blended course. They highlighted the problems arising from technology tools used in the course that could impact their evaluations of instructors, even though the instructor may not have control over those tools. The instructors surveyed also expressed the need for technical support, particularly with producing accessible documents and course materials, while developing or facilitating online or blended courses. Instructors would like to have access to support for learning new technologies, especially when those technologies are related to university or state mandates like accessibility inclusion. Support for using hardware, accessibility, and software is the responsibility of administrators, especially in courses with higher class enrollment. The study emphasized instructor support so that they were not burdened with the heavy lift of both teaching and technical assistance.

Chapter 3: Methodology

This chapter will cover the methodological approach to this study, the research design, ethical considerations, limitations. This mixed-methods study will employ the participatory visual and digital methodology to understand the experiences of community college students and instructors with computer technology and how the assumptions made by college administrators of their computer literacy differ from their students' and instructors' actual skills.

The methodology for this study combines both traditional qualitative methods and a participatory visual and digital methodology with the purpose to enhance the involvement and engagement of participants. The utilization of visual methods in tandem with common methods like interviews allows for a more immediate comprehension of individuals, their personal experiences, and their viewpoints, compared to data collected and managed exclusively by the researcher (Lorenz & Kolb, 2009). Participatory visual and digital research methodology recognizes the potential of visual and digital technologies to facilitate communication, collaboration, and co-creation between researchers and participants. The ontological underpinning of reality is socially constructed and aligns with the methods and approach for this project. The impact of digital and visual technologies are powerful tools to serve as a visual representation of the beliefs, thoughts, and inequities of the public community. The inclusion of participatory visual and digital methodology as a community-based and collaborative approach gives a greater understanding of the diverse lives of participants in difficult-to-access communities, and the diversity of voices and experiences to deepen understanding of the human condition as it relates to a phenomenon.

The Research Design

This study employs a mixed-method qualitative framework, which involves both qualitative and quantitative data collection methods. The decision to use this approach was influenced by several key aspects identified in an exploration of qualitative methods. A qualitative approach "privileges qualitative methods, with the quantitative methods component playing an auxiliary role in a mixed methods framework" (Hesse-Biber, 2010, p. 64). According to Hesse-Biber, one of the most widely employed forms of mixed methods designs for quantitative approaches is the parallel design. I chose this research approach for its ability to analyze findings from each study and examine the findings from one study to help understand the findings from the other. Triangulation means that researchers examine how much the outcomes obtained from one method correspond with those obtained using a different method (convergence). The purpose of using this approach is to authenticate, corroborate or triangulate the research findings by utilizing mixed methods (Hesse-Biber, 2010).

The research design for this study is divided into two phases: Phase I: Quantitative, and Phase II: Qualitative. Phase I focused on quantitative collection methods and Phase II focused on qualitative data. These were in conversation with one another allowing the opportunity to weave a more complex and richer story (Hesse-Biber, 2010). This mixed-method study incorporated traditional methods that include interviews and surveys. This study also employed visual digital media assets that were developed by participants in collaboration with the researcher. These data were designed and created with the use of images, video and voice recordings that are an extension of the participant's self and identity (Saldana, 2011).

Sampling

Three populations were targeted in this study with the community college administrators, instructors, and students in Phase I, and administrators and students in Phase II. Participants were selected using a purposive sampling method. Participants represented diverse backgrounds and experiences in community college education. Purposive sampling is a type of sampling technique where researchers intentionally select participants or subjects for a study based on specific criteria, characteristics, or qualities that they have that are relevant to the research problem. One type of purposive sampling is referred to as maximum variation sampling (Ivankova et al., 2006). Maximum variation sampling is a technique that involves selecting a sample size to achieve as varied a perspective as possible for the study. This technique was used for the selection of participants.

Phase I. The sampling strategy in the first phase of this study focused on each of the three distinct samples; administrators, instructors and students. The first sample were administrators who were identified as full-time employees who held a position as an administrator, director, or above. Instructors were identified as contracted part-time or full-time who teach community college classes in-person and online/remote classes. The email addresses were created by the Human Resources Department. The aim was to reach a sample of five administrators and five instructors. Administrator and instructor populations were recruited through an email invitation along with an attached flyer (see Appendix D). The email invitation to administrators stated they had an option to forward and/or share the invitation with their peers employed at other community colleges. Sampling strategies targeting administrators resulted in a sample size (n = 23), which was larger than the desired sample amount.

The second sample was comprised of enrolled students taking both in-person and online courses in community college. The sample size was dependent upon the number of students enrolled during the summer term and on the number of instructors who agreed to share the invitation with the students in their classes. The invitation emails included three invitation methods, text in the body of the email, and attached flyer, and a link to a pre-recorded video. The pre-recorded video was more personable and engaging in an effort to humanize the study and connect with potential participants. The video was recorded with Zoom and uploaded to a video management platform with closed-captions and dynamic transcript. To be more inclusive, a version was made available with Spanish captions accessible through an embedded link from the English version of the video. There were over 150 impressions between both videos according to the video analytics. The contact with students through instructors resulted in a sample size (N = 36) of those enrolled in their classes during the summer academic term.

The third sample was comprised of part-time and full-time contracted instructors. Instructors were identified as contracted employees and taught classes in the prior or current academic term. The sample size was dependent on the number of contracted instructors in the summer academic term versus the larger number that are contracted during traditional academic year periods. Instructors were expected to have a depth of teaching experience to understand the implications that basic computer skills have on student experience and their own teaching methods and their skills.

Access to student participants in Phase I was facilitated through direct contact with instructors. With their permission, I incorporated the study as part of the class activities. Preference was based on enrollment status and experience with taking community college courses both in-person and online/remotely. The data collection took place over a 2-month period.

Phase II. The sample size of participants in Phase II was determined in two ways: (1) Results from Phase I analysis of survey responses required a follow-up interview with administrators who completed the online survey in Phase I. Volunteers from the administrator sample were solicited to participate in a pre-scheduled semi-structured follow-up interviews (see Appendix H) conducted via the Zoom video conference platform. (2) Students who completed the Northstar Digital Assessment in Phase I were invited for a semi-structured interview. Volunteers from the student sample were invited to collaborate with each other, with the researcher, or individually to produce a digital storytelling project that shared their experience with computer technology by using digital and visual media tools. Phase II was expanded to the entire instructor and student samples of Phase I towards the final days of data collection due to low response rates.

Phase II sampling also included recruiting participants enrolled in an online class and were only available to meet via Zoom video conference. In collaboration with the instructor for the class, I joined the Zoom meeting, but solicited support from the instructor to translate my presentation into Spanish. Participants included all non-native English speakers whose first language was Spanish. It was important to speak slowly and use visual aids when explaining the study and describing what tasks would be completed.

Instrumentation

The instrumentation for this study consisted of a researcher-developed survey that was administered online through Qualtrics, and an IRB-approved interview protocol that guided the follow-up semi-structured interviews that were conducted virtually using the Zoom video conference tool. This allowed the interview to be recorded to the cloud with an auto-generated transcription. Two individual assessments developed by Northstar were administered online through their Northstar Digital Literacy website. Furthermore, online survey platforms offer

inherent analytical functionalities, allowing for immediate data analysis, including graphical representation capabilities within the analytical process (Evans & Mathur, 2018). Consequently, researchers have the capacity to conduct real-time analyses as additional participants complete the survey and contribute their data. (Evans & Mathur, 2018). This minimizes the potential for data entry errors, a common source of inaccuracies in traditional paper-based surveys.

Phase I. Two survey instruments were administered during Phase I of the study: (1) an online survey (see Appendix E) completed by administrators, (2) a Northstar assessment completed by instructors and enrolled students. The administrator survey utilized text entry, open-ended questions, and 5-point Likert scale statements. Administrator assumption questions were primarily answered using Likert questions and were subdivided by student skills and instructor skills. The open-ended questions were held for Phase II. The skills assessment section questions were separated into two common technology areas; basic computer skills and Windows (operating system) questions.

The administrator survey consisted of a section to collect contact information, demographic characteristics (some participants chose not to provide a response). The instrument was designed to be completed in approximately 10-20 minutes to encourage participation. The contact and demographic section was followed by questions that were designed to collect the assumptions, level of confidence, and potential relationship of basic computer skills to students and instructors. Respondents were asked to provide text entry responses regarding their assumptions asking their definition of basic computer literacy in the context of community college instructors and students, basic computer literacy skills of instructors and students, how computer literacy is measured, and the impact of computer literacy to academic preparedness and student success. The remaining questions were Likert questions asking respondents to rate their

agreement with statements asserting the computer literacy status of community college students and instructors using a 5-point scale ranging from (1) strongly disagree to (5) strongly agree, and their confidence using a 5-point scale ranging from (1) not at all to (5) extremely.

The Northstar assessments consisted of two individual assessments that were completed by instructors and students. The basic computer skills assessment, administered online, consisted of an interactive video that presented a series of visual and voice instructions directing the respondent to use a computer mouse to select an image displayed on the screen. Any selection prompted the video module to proceed to the next screen. At the end of the assessment, a summary page was displayed that showed both an overall score and a list of text-based skill areas that were scored as either mastered or needs practice. From this point forward, I will refer to the assessment results as mastered or not mastered. The Northstar Digital Literacy program assessments were reviewed and tested by the host community college for content validity and trustworthiness prior to this study. The final summary page provided a link to respondents to print the summary. Summary pages were generated throughout Phases I and II of this study.

Phase II. During the qualitative phase, interviews were conducted with volunteers, guided by the use of an interview protocol (see Appendix B) that was developed from the preliminary results of Phase I data. This study was designed using a sequential explanatory design, meaning that the final development of the follow-up interview protocol and questions could not be completed until partial analysis was conducted from the Phase I data. A link to the online consent was obtained in Phase I. A copy of the interview questions was emailed to the participants prior to the interview. The advanced communication was intended to spark reflective thoughts. The interview was conducted via Zoom and began with an overview of the problem, purpose and aims of the study and reminding participants to consent to video and audio recording. Summary of

results of the preliminary quantitative results were presented to the interview participants followed by a probing of questions using a list of questions shared and displayed on the screen enabling participants to speak freely in any order. The second instrument utilized in Phase II consisted of a series of open-ended survey questions completed by both administrators and instructors using the survey tool Qualtrics.

Data Collection

Data collection occurred from June 2023 to September 2023. Quantitative data collection was accomplished by means of an online survey application, Qualtrics, to allow for anonymous responses and to easily export/transfer to analysis software such as SPSS or Microsoft Excel. Qualitative data was collected as open-ended survey questions, digitally recorded video, audio, or still image digital files, digitally recorded video and audio of Zoom interviews which were transcribed and imported into Atlas.ti for a detailed review and analysis.

Phase I. The online survey instrument was launched to administrators via email early in the study. Online surveys were open for a twelve-week period and a follow-up email was sent in the final 3 weeks to boost response rates. In each email communication, administrators and instructors were directly emailed a message that included a link to the online survey and a link to the assessment (instructors only). Due to initial low response rates, administrators who received the initial communication were given the option to forward details of the study to their counterparts at other institutions across the state. Email to instructors was intended to be forwarded from the instructor to the students using the communication method of their choice which included direct email or the learning management system (LMS). Administrators were provided a link to the online survey through email distribution.

The second data source of Phase I of the study was the completion of two Northstar Digital Literacy online assessments. The Northstar assessments consisted of two distinct computer skill assessments that were completed by instructors and students. It is important to note the significance of the inclusive feature of the Northstar website through their drop-down menu to select to view and engage with the site either in English or Spanish. This feature was a major determining factor in selection of instrumentation for this study.

Phase II. Phase II was designed to provide a deeper understanding of the critical components of this study: administrator assumptions, instructors' experiences and assumptions, and participants' lived experiences, perceptions, and challenges in the digital realm. Data collected in this research study were obtained from three primary data sources: interviews, open-ended survey questions, and digital storytelling. Instructor and student respondents from Phase I were invited to participate in Phase II to utilize digital storytelling as a means to share their personal experiences with computers and technology in both their academic and personal lives.

Interviews are conversations between the interviewer and the interviewee and take different forms depending on the researcher's positionality. The three common interview methods are: formal semi-structured interviews, in-depth, open-ended interviews, and informal open-ended interviews (Bhattacharya, 2017). Semi-structured interviews involve preparing questions in advance with possible probes identified. Two interview subtypes, semi-structured and informal open-ended interviews were employed with administrators and students. An in-depth, open-ended interview focuses on using a few key descriptive questions as probes to uncover experiences that provide deeper understanding of participant perspectives and experiences. This created an opportunity to dig deeper into the participants' experiences and ask follow-up questions to explore their responses further. I engaged participants who completed a digital storytelling project in

informal open-ended interviews immediately following submission allowing further clarification of their digital media selection and creative process. I guided each digital project participant through insightful probes that create a conversation and use broad probing questions periodically to move the conversation forward (Bhattacharya, 2017).

Each interview was audio-recorded and transcribed verbatim to ensure accuracy in the analysis. Participants' identities were kept confidential, and informed consent was obtained from each participant before the interview. The interviews were conducted in a familiar setting to encourage openness and honesty from the participants. The duration of the interviews was approximately 20-45 minutes. The interview questions asked were in a non-leading and non-judgmental manner. If possible, in the timeframe of the study, interviews would be conducted until data saturation was reached (Bhattacharya, 2017), meaning no new information or themes emerged from the interviews.

Open-ended survey questions were a critical element to Phase II. Administrators and instructors gained access to a series of open-ended questions through the link provided in the email communication sent throughout the data collection phases. Responses were anonymous and identities of respondents were kept confidential. The Qualtrics survey tool allowed participants to save and continue responses to encourage thoughtful and reflective responses.

To initiate the digital storytelling data collection, I met with the initial volunteer participants during their scheduled class time arranged by the instructor. During this time, participants were given an overview of the study and then to the concept of digital storytelling and the available tools for creating their project. I emphasized that participation was voluntary and the option to work independently, collaboratively in groups, or in partnership with the researcher, depending on their preferences and comfort levels. Additionally, to ensure equitable

access, participants were offered the necessary devices and training to facilitate their engagement in this digital storytelling collection. Participants were encouraged to reflect on their experiences with technology and identify the challenges they face in developing computer skills and computer literacy. Participants were asked to create visual products based on their everyday experiences using photography, drawing, or other media. Participants were given the choice to use any form of art they were comfortable with. Following the creation of the visual products, an interview was conducted with each participant to decode the artwork's subtle and hidden meanings. This interview was essential to understanding the meaning behind the artwork and avoiding any misinterpretations by the researcher. The interview was audio-recorded and transcribed for further analysis (Saldana, 2011).

Two instructors allocated class time to enable student participants in the study activities and tasks, ensuring that the study was integrated into the academic curriculum. The first class was held in-person with participants and the instructor present. The second class was only offered online and required additional scheduling to meet via Zoom to discuss and complete the two study phases. Participants were instructed during the visits to the class to choose whether they wanted to work on their digital projects independently, with peers, or in collaboration with the researcher.

Participants had two options for submitting their digital projects. They could either upload related files to a private Google Drive shared folder using a provided link, or they could create recordings during class time using devices provided by the researcher. After each recording session, a follow-up interview was conducted immediately to delve deeper into the experiences and perspectives shared in the digital narratives.

Challenges arose throughout the data collection process due to language barriers of some participants, specifically non-native English-speaking participants. To address these challenges, I did the following:

- Zoom Meetings: Meetings were arranged via Zoom to accommodate limited in-person availability and facilitate assessments and the digital storytelling project. This allowed for remote engagement and participation.
- Google Translate: Language barriers were mitigated by utilizing Google Translate. The researcher shared a Google Translate site with participants, enabling real-time translation between English and Spanish during conversations. This tool was especially helpful for ensuring effective communication.
- Preferred Communication Channels: One of the ESOL instructors provided a helpful tip, sharing that those who identified as non-native speakers preferred to communicate via WhatsApp, which necessitated additional efforts. The researcher engaged in conversations entirely in Spanish, despite not being fluent in reading or writing, using Google Translate to facilitate meaningful exchanges.

Miles (2006) presented the argument for using digital video in qualitative research. Miles supported the use of digital video by providing several advantages it brings beyond the traditional written notes and text, such as the depth of findings, the ease of analysis using a personal computer, and the diversity in the presentation of results. The article explains that the use of video and film technology as a source of data collection has been established since the 1930s, and several technological advances have been made. Like Miles suggested, the use of digital video in social work research offers many advantages for my research study, including more accurate and

detailed records, more transparent quality of audio and video, and the ability to revisit the ethnographic experience.

The study adhered to ethical principles of research, including informed consent, confidentiality, and anonymity. Participants were provided with information about the study, its purpose, and potential risks and benefits. They were also informed of their right to withdraw from the study without penalty. All data was kept confidential and anonymous to ensure the participants' privacy. According to Spiel et al. (2020), the participatory visual design process, researchers must recognize and use an ethical framework that minimizes power relation differences for groups (especially children from marginalized communities) that often are unheard of and experiences constantly interpreted and reframed. Researchers represent participants with a human-centered design approach by incorporating training in ethics, acknowledging, and developing strategies to ward against potential risks to the researcher or to the participants, establishing a framework and guidelines for managing the diverse contextual needs and complex issues around individual characteristics and challenges faced by participants.

The careful and thoughtful approach to data collection in Phase II allowed for a diverse range of participants to share their unique experiences and insights, even in the face of language barriers and technical challenges. It enriched the qualitative data and contributed to a more holistic understanding of the impact of technology on their academic and personal lives.

Data Analysis

The study was organized in a two-phase (I and II) sequential explanatory mixed-method design. Quantitative data in Phase I was analyzed using a descriptive analysis using the SPSS software. Unique numerical codes were automatically generated by the Qualtrics survey tool to

protect the anonymity of the subjects allowing the responses to be candid and compared to assessment results.

In the assessment summary, results were divided into two columns with a list of skill criteria that was either identified as mastered or needs practice. For the purpose of this study, assessment skill variables were categorized and mastered criteria were coded using the number (1) and practice criteria were coded as (0) not mastered. The overall score (0-100) is generated based upon the weighted importance of each criterion that was determined by Northstar. Connected data findings were analyzed by combining the assessment results with the mean from the administrator Likert survey responses. Interview transcripts and responses to open-ended survey questions were carefully reviewed using inductive coding, which "implies the researcher develops codes as breakdown occurs" (Cernasev & Axon, 2023, p. 752). The codes generated were categorized and organized to perform a thematic analysis. The thematic analysis (TA) "is commonly used in qualitative research when a researcher is seeking to understand the behaviors, experiences, or thoughts from a set of data" (Cernasev & Axon, 2003, p. 751). During this process, I compared the themes identified in Phase II to Phase I data to identify common patterns or themes.

The qualitative data collected in Phase II was analyzed using thematic analysis, which involved identifying patterns and themes within the data. Qualitative data was analyzed using an application program named Atlas.ti. The Atlas.ti website describes its services as helping researchers "uncover actionable insights and generate deep insights with intuitive and automatic research tools powered by the latest AI and machine learning algorithms" (Atlas.ti, n.d., para 1). Atlas.ti also claims to offer a better and faster way to academic research results by simplifying the

research process with software for both qualitative and mixed-method data analysis. This online software provided an organized strategy for coding and categorizing the data.

Using the coding method, codes were organized into themes and/or categories to identify patterns and connections between the visual products and the participants' experiences (Saldana, 2011). Video or audio footage was reviewed multiple times to ensure the reliability of the data. The resulting video clips, still images/frames, and transcribed text were analyzed for their depth of findings and accuracy of the documentation (Miles, 2006). The analysis of media data was conducted using a thematic analysis approach to identify common themes that emerge from the visual products created by participants. The analysis involved the identification of themes and patterns in the data, which was organized into categories and subcategories. The analysis also involved comparing the perspectives of community college students, instructors, and administrators to identify areas of consensus and disagreement.

Table 1 provides an outline and roadmap for the research design of the study. The table includes the alignment of the research questions, timing of the data collection activities, the justification for each activity.

Table 1

Research Questions and Data Collection Roadmap

Research Question Alignment	Data Collection Method	Sample Size	Timing	Justification
RQ 1: What are the common assumptions made by community colleges about the computer literacy skills of students and instructors?	Phase I - Online Survey Phase II: Open-Ended Survey Questions and a Semi-structured follow-up interviews with administrators.		Completed throughout the study as schedules permit.	Interviews provide in-depth feedback that may not be revealed with notes or data.
RQ 2: How accurate are these assumptions compared to the actual computer literacy skills of students and instructors?	Students - Administer online a free Basic Computer Skills Test offered by the NorthStar Digital Literacy Project. Scores are numerical as percentages out of 100. Instructors - Administer online a free Basic Computer Skills Test offered by the NorthStar Digital Literacy Project. Scores are numerical as percentages out of 100.		Incorporated as the first step in the assignment in week 3 Completed throughout the study.	Computer Skills test scores help shape and answer the assumptions versus the reality.
RQ 3: How do community college students experience computer technology in the educational setting and their personal life?	Contact instructors of the First-Year Experience and Computer Technology courses to request collaboration to incorporate the study as part of the participation and course activities. Collect digital files produced by the student participants (i.e., video, audio recordings, still images, narrated images) One follow-up Semi-Structured Open-Ended Interview	Administrators n=23 Instructors n=14 Students n=36	Attend a class as a guest one week prior to the start of the study Begin production in week 3 and continue for a 3–4-week period of the 11-week term. Completed as a post-assessment at the end of the assignment submission.	Allows me to engage with participants as thought partners and co-authors of the study design and media production process of the study. Media production assets and files will provide a more compelling and in-depth view of their experiences through the form of visual media. This interview provides greater depth and context to their expressions through media.

Ethical Considerations

The decision to select this research approach requires the researcher to decide who was involved in data analysis, write-up, and dissemination, including articles resulting from the process (Gubrium & Harper, 2013). Participants or community members are "positioned as key figures in the idea- and story-generation process and in providing feedback" (Gubrium & Harper, 2013, p. 99) in the final phases of the research project. Visual methods allow for a more immediate comprehension of individuals, their personal experiences, and their viewpoints compared to data collected and managed exclusively by the researcher (Lorenz & Kolb, 2009). This central aspect of the methodology is vital to this study and the insights gained from the study could inform future practice or a new course design. Participants, whose voices are often lost in numerical data points, are empowered to be creative in how they visualize their engagement with the social environment, family, and with technology that contributes to their lived experience. It was imperative that participants also understood the explicit purpose of the study and were provided the appropriate freedom and options with which to use to produce quality and usable data.

It is essential for this study to incorporate strategies that will prioritize ethical practices for participants throughout the research study and anticipate the limitations that may impact the process and overall outcome. To prepare for intended and unintended ethical considerations and limitations, I followed the ethical guidelines set by the ethical guidelines set by Appalachian State University's Institutional Review Board (IRB). Informed consent was obtained from all participants. Participants were ensured that their participation was voluntary and that their anonymity was maintained and secured. All data collected was kept confidential, in my possession, and was used only for the purpose of this study (Saldana, 2011).

As part of the pre-study workshop and clearly stated on the consent form, participants were informed of the risks and benefits of participating in this study and were asked to sign a consent form before their involvement. The confidentiality of research participants was maintained throughout the study (Miles, 2006).

Although film and video were one of several data collection methods, it was important to acknowledge and address the possible ethical implications there are with the use of video in research. Miles (2006) discusses the ethical implications of presenting video data in research, particularly when identifying participants. While digital publishing allows for more diverse modes of representation, presenting video data raises critical ethical questions. Miles (2006) discusses the various ways video data can be presented and the importance of considering the ethical implications of these choices. The article addresses the issue of identifying participants in video data and the complexities that arise when participants can be seen and heard. Miles recommends giving participants more information about how and why collected video material was used and tailoring informed consent documents to include language that explains options for choosing to be identified or not. The author also notes that ethical issues related to identifying participants are rarely straightforward and may require ongoing negotiation throughout the research process. Miles (2006) supports the common practice of assigning pseudonyms or an alias to participants so that they cannot be identified, and for a researcher to provide an alias for the school where the research takes place.

Limitations

It is important to discuss the limitations of this study that could potentially affect interpretations and not capture the full range of factors that could impact the results of the study. This section walks through the limitations of this study that required strategies to overcome.

First, this study was limited by the sample size and diversity of the participants (Miles, 2006). The sample size used for data collection was relatively small and thus the results may not be representative of larger populations or generalizable to all community college students and instructors. Second, much of the data collected relied on self-reported data from participants which could be incomplete, inaccurate or include bias affecting the reliability. Third, the findings in this study were time sensitive due to the study timeline and the timing of the subjects. The study was conducted in the summer academic term and with only a short snapshot of time rather than a more comprehensive study over a longer period such as a full academic term. Fourth, the activities in the study required a computer or mobile device to complete. Participants may have had limited access to technology, cameras and editing software.

Lastly, some research activities required a basic level of technological skills to participate. The assessment, for example, was not available in a printed version or any other alternative method for data collection which could impact the ability of the participants to engage effectively. Some participants shared that they had limited access to reliable internet or a computer outside of class, and therefore required assistance and access to a device to complete research activities.

Trustworthiness and Validity

Stahl and King (2020) present a perspective that is central to establishing trustworthiness and validity in a research study and stated the following:

> For most qualitative researchers, reality is constructed, therefore the quantitative concept of validity is simply not a goal of qualitative research. Rather, qualitative researchers strive for the less explicit goal of trustworthiness, which means that when readers interpret the written work, will have a sense of confidence in what the researcher has reported. Credibility is highly subjective and relies on individual judgements. Ideas should share

> some relationship with each other. Credibility is a construction on the part of the reporter and the subsequent readers. (p. 26)

Using this lens, I recognize there are potential threats to the studies' trustworthiness and credibility that however, "based on a carefully designed research process, detailed notes of how each phase of research was conducted and a discussion of strengths and limitations of research in the final report" (Kyngas, 2020, p. 42). An example of potential threat is the possibility of participants providing responses they believe are expected from the study rather than their true opinions. To address the threat, the study will disseminate anonymous surveys and emphasize the importance of honest responses.

The implications and significance of the study are multifaceted. The study aims to provide evidence-based recommendations for community college administrators working towards a strategy to address any disparities in technology proficiency among students and their instructors. The study will also contribute to the broader literature on computer literacy in education by highlighting the importance of accurate assumptions about technology proficiency in promoting effective technology use in higher education. By examining and investigating the assumptions made by college administrators regarding technology proficiency and exploring potential strategies to address any gaps in technology proficiency among students and instructors, the study will contribute to developing evidence-based policies and programs that promote effective technology use in community colleges.

Assisting Participants with Low-Tech Skills or Access to Devices

I took several steps to assist students with low-tech skills to ensure that all students could participate meaningfully in creating digital and video content. Student and instructor participants were invited to attend a workshop with an option to attend in person in a designated location or

virtually via the Zoom video conference software. The workshop was intended to provide information and training to use digital tools and devices. The workshops were open to all students and instructors participating in the study. During the workshop, participants were provided opportunities to gain a fundamental knowledge of operating the camera function, audio recording, and photography. Participants were informed of the available video creation templates on social media apps to create content. Participants, as part of the visual and digital methodology, were given the option to work together in groups, collaborate with the researcher, or work independently.

In addition to the workshop, one-on-one consultations were offered to participants who required additional help to create their digital story. This support was available to students during scheduled hours communicated via email and printed flyers. It was essential to this study to create a safe, collaborative, and inclusive environment, regardless of their level of technical or computer skills.

The Current State of Computer Literacy

The COVID-19 global pandemic was a crisis that caused rapid and unprecedented disruption across all entities, but especially in higher education, impacting students, instructors, and institutions. This disruption has placed a greater emphasis on the diverse needs of our faculty but also on individuals that desire to continue their education, but face barriers to attending fully online or fully in-person. Students that enroll in community college often have lifestyles that require flexible, customizable, technology-enhanced learning opportunities that suit their busy schedules. With more community colleges offering online, distributed learning opportunities, students are no longer constrained by geographical location and can engage in high-quality educational experiences from anywhere, at any time, on any device (O'Keefe et al., 2020).

Participatory visual and digital research methodology is one of the less commonly applied qualitative research methods in the social sciences. Qualitative methods typically include methods such as interviews (structured or semi-structured), observations, and surveys. creative forms of communication and expression. The broad range of digital tools in research available today was not available prior to the 1970s. The advancements in digital technologies created a more sophisticated production process that is less complicated and easier access to the tools required for participants to fully engage in the process of the research.

Earlier trends that are still relevant today, applied participatory methodology toward computer, digital, and information literacy research among community college students and students in higher education. Goode's (2010) study examined the student body and whether they will have the technical knowledge and skills to navigate through this digital environment. The university included in the study did not have formal technology prerequisites for their students who enrolled with differing technological skills, stratified by gender, socioeconomic status, and racial backgrounds. Beyond skills, students' varied computing histories can result in a range of technology identities that impact their relationship with technology in their academic, social, and career aspirations. Goode approached the research questions by unpacking the relationship between the home and school computing history of undergraduate students, their technical knowledge, and the ways that this knowledge shapes their attitudes toward computers, scholarly endeavors, and future career plans. He employed a mixed methods approach, combining a large-scale student quantitative survey and individual case studies, but he did not incorporate participatory visual methods in this study.

Kaeophanuek et al. (2019) used a mixed-method approach, combining a quantitative survey and an increasingly popular visual method referred to as digital storytelling. Digital

storytelling is the practice of using digital tools, video searches or hand-drawn images, scanned images, photographs, graphics, texts, recorded audio, music, and sound effects while incorporating the learner's voice narrating their stories. Results from the study ideally led to their learning process model to be used for reference on the part of teachers planning and implementing instructional activities to enhance the digital literacy of undergraduate students. In addition to digital storytelling, Kaeophanuek (2019) chose the mixed-method approach for its usefulness in determining social factors that contribute to technological proficiency, and qualitatively to explain the nuanced effects of how technology proficiency influences academic pathways, attitudes, motivations, and future career paths.

Balaman (2020) conducted their study to examine the impacts of digital storytelling, the learners' self-efficacy, and attitudes toward education technology. Balaman also aimed to test potential changes in the related variables for technology use before the implementation, students' existing experiences with computers and the internet were also determined. The methodology for this study utilized a combination of tools and software (i.e. video-editing software, storyboarding sheets, and Google Drive). Participants could use the tools to capture, create, view, and share their stories digitally, utilizing a mix of audio and visual elements such as visual effects, music, and voiceover. Using Google Drive as a web tool in the study provided a virtual environment where students could collaboratively prepare their stories. Balaman also included Digital Storytelling, but it was only available to participants that could share digital videos, see the posts, make comments, or like posts through social media platforms like Facebook. Like previous studies, data collection instruments, and pre and post-test surveys were used in the study.

To give shape to Phase II qualitative data collection, I applied both an arts-based and elicitations approach to add depth and breadth to the study. According to Bhattacharya (2017), the

use of arts-based approaches in qualitative research has become increasingly popular among researchers aiming to present findings with depth and complexity. The article explores approaches that involve incorporating principles of the creative arts into different stages of qualitative research, with the primary goal of producing artistic representations of the findings. Scholars who use this approach combine creative arts with qualitative research methods to create dramatic, poetic, or other forms of artistic renderings of their work. For instance, one might create a poetic representation of interview data, a photo essay from pictures taken during the study, that integrates various data sources such as interviews, observations, and archived materials. The fundamental idea behind arts-based approaches is to merge scholarship, creative arts, and research methodologies (Bhattacharya, 2017).

One of the central aspects of this study centered around the participatory visual digital methodology through the creation of digital stories by student participants. The digital storytelling projects that volunteer student participants created were a critical component of the participatory visual and digital methodological data collection method. For projects that did not include a narrative or text, it was important to interview with the participant about what their project was essential to decode the artwork's subtle and hidden meanings rather than interpreting the product independently. The follow-up interview was intended to allow participants to explain the meaning behind their final project and provide insights into their perspectives (Saldana, 2011). However, out of the 4 projects that were completed, only one interview was conducted during a brief meeting following the in-person video recording. The participant requested to partner with me to set up the camera and provide a safe space to film. The remaining three projects included a combination of text and images (one with a voiceover), as a result, follow-up interviews were not scheduled.

Chapter 4: Findings and Results

Introduction

The focus of the literature is predominantly on information and digital literacy, shifting away from basic computer literacy skills. That shift leads to greater digital divides and perpetuates the disparities in competency levels of community college students and instructors. I agree with Cox's (2009) argument that, even in such a shift, "in order to become competent users of information in the digital age, students must first be able to use the basic tool of information retrieval, the computer" (para. 3). According to Cox, college students lack essential computer skills, and it's often assumed that they are proficient in using the Internet, though this assumption is inaccurate, and studies show a significant portion of the population, particularly older and low-income individuals, do not use the Internet. Cox suggests that "computer literacy includes a set of skills which are much more basic than the critical thinking and research skills included in the definition of information competency" (para. 6). Without these skills, tasks such as online registration and accessing class assignments become challenging. Similar assumptions are made by community college leadership not only of the computer skills of their vastly diverse student body, but also of their instructors and faculty.

This chapter presents the findings and results of this study through a mixed-methods analysis of data collected from community college administrators, instructors and students employing online surveys, interviews and online assessments. The findings are presented in three sections. The first section introduces the descriptive statistical analysis of Phase I survey data and a biserial correlation analysis of assessment data. The second section focuses on the Phase II thematic analysis of administrative open-ended questions, administrator and student interviews, instructor open-ended survey, and students' media artifacts which were collected to bring deeper

meaning to the quantitative data. The third section integrates the outcomes from both Phase I and Phase II, connecting insights and relevant findings of both Phases I and II.

Summary of Research Methods

This study utilized a sequential explanatory mixed methods design, strategically chosen to provide a deeper comprehension of the research problem. This design promotes a straightforward approach allowing opportunities for the exploration of the quantitative results in more detail (Ivankova et al., 2006). The interview instrument for Phase II was informed by the outcomes of the data collected during the quantitative phase. Phase I data collected through the administration of an online survey to community college administrators, and online assessments to students and instructors, were analyzed using descriptive statistics and correlation analysis of the online assessments utilizing statistical software (SPSS). There were two primary data sources for Phase I of this study. The first source was the Administrator Survey which was divided into four main sections (see Appendix E). Table 2 shows the organization of those four main sections. Section 1 presented open-ended questions, while sections 2-4 list statements related to both students and instructors and required either a level of agreement using a Likert scale or level of confidence using a Likert scale.

Table 2

Administrator Survey Instrument Response Type by Section

Section	Response Type	Rating
Section 1	Open – Ended Questions	N/A
Section 2	Likert Scale (Level of Agreement)	(1) *Strongly Disagree*, (2) *Disagree,* (3) *Neutral*, (4) *Agree*, (5) *Strongly Agree*
Sections 3 - 4	Likert Scale (Level of Confidence)	(1) *Not at All*, (2) *Slightly*, (3) *Moderately*, (4) *Very Much*, (5) *Extremely*

The second data source for this study consisted of the Northstar Digital Literacy Assessments (Basic Computer Skills and Windows [OS]) distributed to both instructors and to students (see Appendix G). At the end of each assessment, an overall maximum score of 100 was generated in addition to a detailed summary of skills areas that were mastered or indicated practice was needed (or were not mastered, in other words). The administrator level of confidence survey instrument questions was based on each of the skill level areas as defined by the Northstar Digital Literacy program. According to the Northstar website, a score of 85 or above indicated mastery of the assessment type. Conversely, an overall score of 84 or below indicates that further practice is required in order to achieve mastery (Northstar, n.d.).

The results of Phase I were used to develop the follow-up interview questions (see Appendix I) conducted in Phase II. The purpose of the semi-structured, open-ended follow-up interviews were to glean deeper insights of findings from Phase I. Furthermore, an open-ended survey was administered to and completed by instructors and administrators. Text and transcripts extrapolated from digital storytelling projects by student participants were incorporated into the overall thematic analysis process. The interview protocol and questions are available in Appendix B.

Results of the Sampling Strategy

This study employed a purposive sampling strategy to recruit participants, resulting in three distinct samples. The email invitations were sent directly to 63 college administrators. The email text included an overview of the study and a link to the online survey and resulted in n=23 participants. Printed flyers were also distributed as a follow up to the email invitation. A total of 37 email invitation were sent directly to instructors including an attached flyer, link to a pre-recorded video invitation, and links to the survey and assessments. Teachers were asked to

distribute this flyer to students enrolled in their classes. A total of n = 14 instructors participated in the study. The student sample total was n = 36. The final population totals are summarized in Table 3.

Table 3

Participant Totals

Participant Categories	n
Community College Administrators	23
Community College Instructors	12
Community College Students	34
Administrator Volunteers (Phase II)	6
Student Interviewees	4

It is also important to provide the self-reported demographic characteristics of the participants. A total of 33 reported themselves as a college administrator, and a subset of those respondents (n = 23) completed the survey in its entirety. Incomplete data resulted for the 10 responses who did not fully complete the survey are omitted from the analysis. Responses show a pool with diverse backgrounds and roles within the institutions completed the survey. The majority of respondents provided the following demographic information.

- **Age:** 21% between 26-49 years, 19% over 50 years.
- **Language:** 2% speak English as a second language.
- **First-generation:** 3% were first-generation college students in their family.

These characteristics provide context for understanding the perspectives of the administrators who participated in this study.

Phase I: Quantitative Findings

Administrator Survey

Two quantitative instruments were used in this study: an online survey and Northstar digital literacy assessments. The administrator sections of the online survey were completed by administrators. The first set of analysis compared responses to Likert scale questions to the characteristics of the respondents to explore relevant connections that may emerge. The subsequent sections of Phase I aims to answer the first research question:

- RQ 1: What are the common assumptions made by community colleges about the computer literacy skills of students and instructors?

Figures 2 and 3 below presents descriptive statistical results for two assumptions rated in the first section of the online survey asking administrators to rate their level of agreement for a list of 7 statements (see all results in Appendix F) using a 5-point Likert scale ranging from (1) *strongly disagree* to (5) *strongly agree*. As shown in the figures below, 30% are neutral or undecided and 30% assume first-year students already have basic computer skills. As shown in Figure 4, 65% of the administrators assume instructors have basic computer skills when hired.

Figure 2

Administrator Assumptions that First-Year Students Already Have Basic Computer Skills

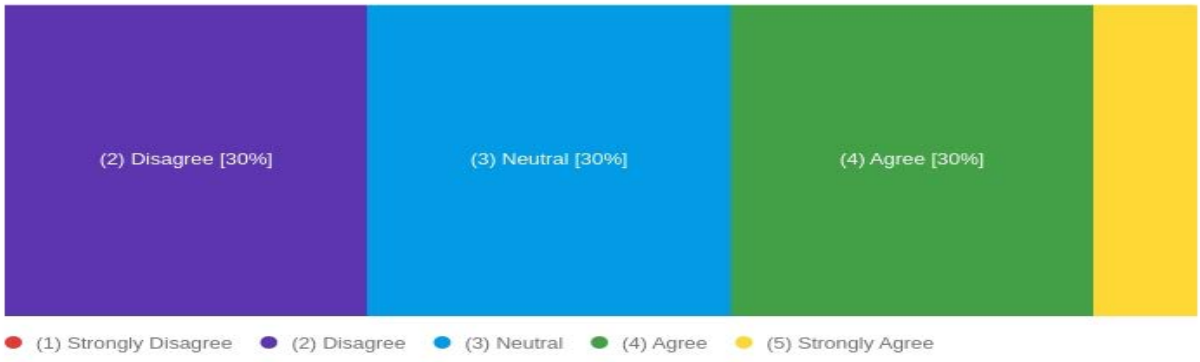


Figure 3

Administrator Assumptions that Instructors Have Basic Computer Skills When Hired

Online survey respondents were asked to select from a list of demographic and current role at their college. Later in the survey, they were asked to respond to a series of questions using a 5-point Likert scale ranging from (1) *strongly disagree* to (5) *strongly agree*. Table 4 reports administrator perceptions of the technical skills for faculty. These data are broken down further by the age range of the respondents. This data helps to examine whether age plays a role in an administrator's perception.

Table 4

Administrators Assumptions: Faculty and/or Instructors at This College Have Basic Computer Skills Upon Hiring Organized by Self-Identified Categories

Administrator self-identified categories	*n*	(1) Strongly Disagree	(2) Disagree	(3) Neutral	(4) Agree	(5) Strongly Agree
I am a community college administrator.	23	0	4.3	26.1	65.2	4.3
I am between ages 26-49	9	0	11.1	44.4	44.4	0.0
I am over the age of 50	9	0	0	0	88.9	11.1

Note. The values below each Likert rating represents the percentage of the total (N) respondents for each category. The Likert rating is using a 5-point scale ranging from *strongly disagree* to *strongly agree*.

Key Findings of Administrator Assumptions about Instructors

Assumptions about Instructors. Based on the data as presented in Table 4, the following key findings are presented. It is important to remember that only the 23 respondents are reflected in each demographic or category. The percentages included are calculated by the number of respondents in each category. In general, the administrators believe that the faculty have the technical skills necessary upon hiring. Nearly 70% of respondents agree or strongly agreed that this was the case. However, there is a striking difference in responses based on the age of the administrator. Of the 23 administrators who completed the survey, older respondents (above 50 years of age) have more confidence that faculty will have basic computer skills than their younger counterparts (see Table 4). In this particular case, 100% of respondents who stated that they are over 50 either agreed or strongly agreed that incoming faculty will have the necessary technological skills, however, only 44% of administrators under the age of 50 agreed that this would be the case.

Assumptions about Students. Table 5 shows data about the administrators' assumptions of students by age range. Following the table are key findings from this data. Only the 23 respondents who completed the entire survey are reflected in the table. The percentage is calculated by the total number of respondents in each category.

Table 5

Administrators Assumptions: First-Year Students Have Basic Computer Skills

Administrator self-identified categories	*n*	(1) Strongly Disagree	(2) Disagree	(3) Neutral	(4) Agree	(5) Strongly Agree
I am a community college administrator.	23	0	30.4	30.4	30.4	8.7
I am between ages 26-49	9	0	22.2	33.3	33.3	11.1
I am over the age of 50	9	0	44.4	22.2	22.2	11.1

Note. The values below each Likert rating represent the percentage of the total (N) respondents for each category. The Likert rating is using a 5-point scale ranging from *strongly disagree* to *strongly agree*.

Key Findings about Administrators Assumptions of First-Year Students

As opposed to the perceptions that administrators have about faculty skills, respondents were much less confident that students had the necessary technical skills. Whereas nearly 70% of administrators agreed that faculty had the technical skills necessary to do their job (see Table 4), less than 40% said the same thing about students. Also, the difference in perceptions by age were not found when discussing the skills of students. Regardless of age, most of the respondents were either neutral or believed that students did not have the technical skills.

Northstar Digital Literacy Assessments

Instructors (n = 14) and students (n = 33) completed two Northstar Digital Literacy assessments: Basic Computer Skills and Windows. Instructors completing the assessments were asked to distribute a researcher-supplied email and flyer (see Appendix D) to students enrolled in their class along with the link and instructions to take the Basic Computer Skills and Windows assessments. The Northstar website provided Language (English/Español) options to display the text on the website and the contents of each assessment from a drop-down menu. The menu defaults to English. The user must click the drop-down menu to view the assessments in Español. A total of 33 student responses were received. Tables 6 (students) and 7 (instructors) below show

the students' mean overall scores from the basic computer skill assessment is lower than the instructors' mean overall score from the windows assessments for the student participants (Table 6) and for instructor participants (Table 7).

Table 6

Student Basic Computer Skills Overall Score and Windows Overall Score

	Basic Computer Skill Assessment M Score	Windows Assessment M Score
Mean	88.9472	86.2091
Std. Deviation	8.97137	13.13308
n	36	33

Note. Northstar badge criteria (Appendix E) to achieve a mastered score is 85 or above.

Table 7

Instructor Basic Computer Skills Overall Score and Windows Overall Score

	Basic Computer Skill Assessment M Score	Windows Assessment M Score
Mean	95.3	88.7
Std. Deviation	5.7	11.8
n	14	33

Note. Northstar badge criteria (Appendix E) to achieve a mastered score is 85 or above.

Key Findings of the North Star Digital Literacy Assessments

Students performed similarly on both assessments (88.9 on Basic Computer Skills and 86.2 on the Windows Assessment). Instructors generally scored higher (m = 95.3) than students (m = 88.9) on the basic computer skills assessment. What stands out is that both students and instructors scored lower on the Windows Assessment than the basic computer skills assessment. The average instructors' scores on both assessments were higher than student scores. Instructors scored considerably lower on the Windows assessment (88.7) than on the basic computer skills assessment (95.3).

The key findings from this data show that instructors generally performed better on both the computer basic skills and windows assessments (m = 95.3, and m = 88.7) than students whose mean score was lower for the basic skills (m= 88.9) and for Windows (m=86.2).

Comparison of Scores with Assumptions. To provide further insight into the overall scores, Tables 8 and 9 show the specific skills in each assessment where students (Table 8) and instructors (Table 9) either mastered or did not master that skill. Exploring this further may help gain insights on where disparities may exist requiring resources and support. The tables present a subset of skills (see full list in Appendix H) divided by a not mastered and a mastered column. Below each column are the number of respondents (*n*) for each skill, and the corresponding mean overall score in parentheses.

Table 8

Student Basic Computer Skills Assessment by Skill and Mean Score

Student Basics Computer Skill	Not Mastered	Mastered
Identify specific computer hardware (system unit, monitor, printer, keyboard, mouse or touchpad, ports, touchscreen)	6 (77.1)	27 (91.1)
Log on to and shut down a computer	4 (77.6)	29 (90.0)
Demonstrate knowledge of keys on keyboard (Enter, Shift, Control, Backspace, Delete, Arrow Keys, Tab, Caps Lock, Number Lock)	18 (84.8)	15 (92.8)
Identify mouse pointer shapes and the functions they represent (spinning wheel (loading), (text), arrow (basic clicking), hand pointer (clickable links)	19 (84.0)	14 (93.3)
Utilize common controls for screen interaction (selecting checkboxes, using drop-down menus, scrolling)	19 (84.9)	14 (93.3)
Demonstrate understanding that it is possible to customize a computer for increased accessibility (customizing a mouse for left-handed use and sensitivity, and changing screen resolution on a monitor)	17 (83.7)	16 (93.5)
Turn computer and monitor on and off	7 (79.2)	26 (91.0)

Note. Table shows a subset skill from the student participant assessment results (see Appendix H). Key findings scores are highlighted in boldface.

Key Findings of Student Basic Computer Skills Assessment

Overall, students struggled in four main areas of the basic computer skills assessment where up to one half or more did not master the skill. The student assessment data results (n=33) in Table 8 reveals that close to half of the respondents show mastery while the other half did not master four basic computer skills areas:

1. Demonstrate knowledge of keys on keyboard,
2. Identify mouse pointer shapes and the functions they represent,
3. Utilize common controls for screen interaction, and
4. Demonstrate understanding that it is possible to customize a computer for increased accessibility.

Table 9

Instructor Basic Computer Skills Assessment by Skill and Mean Score

Instructor Basic Computer Skill	Not Mastered	Mastered
Identify specific computer hardware (system unit, monitor, printer, keyboard, mouse or touchpad, ports, touchscreen)	4 (88.1)	10 (97.4)
Log on to and shut down a computer	3 (88.6)	11 (97.2)
Demonstrate knowledge of keys on keyboard (Enter, Shift, Control, Backspace, Delete, Arrow Keys, Tab, Caps Lock, Number Lock)	8 (92.7)	6 (97.5)
Utilize common controls for screen interaction (selecting checkboxes, using drop-down menus, scrolling)	4 (91.3)	8 (97.0)

Note. Table shows a subset of skills from the assessment results (see Appendix H). The total number of responses are shown for each skill showing their mean overall score in parentheses.

Key Findings of the Instructor Basic Computer Skills Assessment

The instructor sample size was n=14 bringing more attention to the sections where more than 2 did not master the skill. Instructors' scores show they have basic computer skills and their

basic computer skills assessment scores are much higher than students. Table 9 shows the skills where instructors did not master a skill.

There were four basic computer skills that instructors did not master:

1. Identify specific computer hardware,
2. Log on to and shut down a computer,
3. Demonstrate knowledge of keys on keyboard, and
4. Utilize common controls for screen interaction.

Phase II - Qualitative Findings

Open-Ended Surveys and Interviews. The data collected in Phase II of this study was pivotal to delve into their perceptions to further answer the research questions: What are the assumptions of administrators of computer literacy skills of students and instructors? I employed two methods: an open-ended survey and a semi-structured follow-up interview to also uncover any underlying assumptions that influence decision-making processes and identify areas for alignment or improvement. The findings are organized by the main themes identified from the coding and thematic analysis of the qualitative data collected (interviews and open-ended questions) by administrators and instructors using Atlas.ti software. Administrators (N=23) and instructors (n=14) provided responses to open-ended questions. Seven administrators (7) volunteered to participate in the semi-structured follow-up interview with 8 questions guiding the discussion (See Appendix I). The interviews were video and audio recorded, and transcribed automatically by the features in Zoom. Figure 4 shows a snapshot of the themes and data collected during this phase.

Figure 4

Excerpt of Responses from Administrators

Ultimately, the findings have potential to inform strategies to ensure policies and allocation of resources. Structures for support are in response to the diverse computer literacy needs of both the students and instructors. During the second phase of the study, administrators provided their perspectives in both open-ended surveys and a follow-up interview.

Key Findings from Administrator Survey and Interviews

Presented below are four themes that emerged and additional findings that emerged from the open-ended question survey completed by administrators and a separate open-ended survey completed by administrators and by instructors. Following the four themes are data showing statements and quotes taken directly from the survey and interviews as shown in Figure 4 above.

Theme 1. Administrators believe lacking computer literacy skills can negatively impact a student's academic success. According to administrators, they believe poor basic computer literacy skills may deter students from persisting or completing their education. Results of the

open-ended survey show that administrators also believe “those without computer literacy are at a significant disadvantage. They will struggle more with coursework.” Without these skills, students may struggle with coursework, be uninformed about important college information, and find it difficult to complete non-academic processes. One noted that “if they are unable to navigate (or even find) an LMS page, they will struggle. If they are unable to register for classes or submit financial aid documents, they will struggle. If they can't create and edit a word document, they will have a hard time being successful.” The lack of basic computer literacy can hinder learning and create barriers for students who have been underserved by the disparities in support from the educational system. Students may be afraid to ask for help with computer basics, leading to them getting overwhelmed or left behind. There is a belief that struggling with computer literacy skills may deter students from persisting or completing their education. Overall, computer literacy skills are essential for academic preparedness and student success in community college.

Theme 2. Administrators assume that the level of basic computer skills vary depending on their educational background, socioeconomic status, and age. Some assume that many students will have basic skills, such as using email, Microsoft Word, and Google Drive. Others recognize that some students, particularly adult learners or those from underserved backgrounds, may have gaps in their skills and limited access to technology. One administrator expressed having a shift in their assumptions about students' computer skills, stating, "My assumptions have changed since working at a community college for some time. They are more limited; I understand that some community college students have very little computer skills and need a significant amount of coaching, not just to be able to be successful in class, but to navigate the systems that will get them into a class in the first place."

It is often noted that older students and English as a second language (ESL) learners may require more support in developing computer literacy skills. Overall, the assumption is that there is a range of skill levels among first-year community college students, and additional training and support may be needed to ensure success in online learning environments.

Theme 3. The lack of basic computer literacy can hinder learning and create barriers for students who have been underserved by the lack of support in the educational system. Reflecting on an unintended consequence of the pandemic, an administrator noted, "Our only silver lining [to the pandemic] was that K [kindergarten] through 12 got locked out just like we did. And the kids had to get computers and high-speed internet so their parents could use their technology." One of the responses highlighted the varying skill levels among first-year students, mentioning:

> I would assume first-year students would have the ability to log on, navigate and use common software packages. Many recent high school graduates have basic skills needed; community college students who come from adult/returning populations may be less likely to have those basic skills. Other groups (e.g. ESOL/ABE students) may be less likely to have basic skills upon entry."

Echoing that belief, another stated, “I assume that there are some non-traditional students of a certain age who may have challenges with basic computer literacy skills and those students where English may not be their first language.”

Students may be afraid to ask for help with computer basics, leading to them getting overwhelmed or left behind. According to administrators, “I think NOT having these skills can hinder learning, and there may be some for whom technology is a barrier or for whom there's some level of technology aversion. Students may be afraid to ask for help with some of the computer basics, and then they get overwhelmed or left behind.” On the other hand, having

computer literacy skills, including understanding hardware and software and being willing to learn new skills, is crucial to student success. Additionally, the study sheds light on the administrator's awareness of the challenges faced by ESL students and the disparity in instructor needs for further training compared to students.

Theme 4. The assumptions about the basic computer literacy skills of community college instructors are mixed. Overall, it is assumed that most instructors have at least basic computer skills, including knowledge of email systems, word processing software, and internet navigation. Many instructors are also expected to be familiar with learning management systems and online research tools. However, there is also recognition that some instructors may have limited computer skills and may require additional support or training. Additionally, it is acknowledged that there may be variation in the depth of knowledge and application of computer skills among instructors. Regarding instructors, one administrator cautioned against the making assumptions that all instructors possess a baseline level of tech proficiency, stating, "There is an assumed ability that instructors have based on their position, which is detrimental to student learning. That assumed ability results in instructors not seeking resources available for training and support."

This sentiment was echoed by another administrator, who emphasized the disparities in faculty expectations and students' disappointment, stating:

> Many faculty have advanced level skills in Word software and basic computer functions, but some faculty have basic/limited computer skills and do not utilize technology in their classrooms effectively. Computer skills are not really taught in classes and faculty expect students to come prepared with the right equipment and the basic skills to use that equipment when they come to class.

Another administrator emphasized the assumption of a related struggle between instructors and students, stating, "I would assume the percentage of instructors who struggle with basic computer literacy would be similar to that of students. There is an assumed ability that instructors have based on their position, which is detrimental to student learning. That assumed ability results in instructors not seeking resources available for training and support."
The varying levels of computer skills among faculty were acknowledged by another administrator, who wrote, "Many faculty have advanced level skills in Word software and basic computer functions, but some faculty have basic/limited computer skills and do not utilize technology in their classrooms effectively." Additionally, the administrator highlighted the expectation that students have regarding faculty proficiency in technology. There was also an assumption of a strong majority of community college instructors possessing basic computer literacy skills, as one administrator mentioned, "My assumption is that a strong majority of community college instructors have basic computer literacy skills."

Finally, the expectation of instructors being able to set up a computer, perform basic functions with tools like Google Suite or Microsoft Office, and have experience with learning management systems was shared by another participant: "I would assume instructors can set up a computer and perform basic functions with tools such as Google Suite or Microsoft Office. I would also assume they have experience with at least one learning management system. If not, I would expect them to be willing and able to learn how to use such a system within a month or so."

The Instructors' Experiences. The second phase of this study also focused on capturing the diverse experiences of community college instructors with computer technology. This critical phase involved the collection of open-ended survey questions that were designed to center and amplify the voices of instructors. The questions focused on their basic computer literacy skills,

personal experiences with technology, and sharing the unique ways in which their experiences shape their instructional strategies. Figure 5 shows a snapshot of some responses collected from instructors.

Figure 5

Excerpt of Experiences Shared by Instructors

The emphasis on the responses from instructors aims to amplify the rich narratives that define the dynamic relationship between instructors, technology, and pedagogical practices in the context of community colleges. There were diverse perspectives about basic computer skills and the impact it has on teaching in community colleges.

Key Findings from Instructor Responses

Instructors from various backgrounds report a wide-range of experiences with computers from early exposure to a lack of access to basic or advanced technology at home. One instructor courageously shared that they are an immigrant from Mexico and highlighted the lack of computer skills in the public educational system, stating, "I never had the privilege to use a computer then. And my family was very poor…I had not the opportunity to buy a computer for

my own use." However, there were instructors who had early access to computers stating, “I always worked with computers. I had computer literacy classes as a kid and when I got to college I brought my own computer. I wish that I had taken some coding classes when I was in high school and college, but regardless, I have been generally able to use computers without a concern.”

Instructors believe the lack of computer literacy skills can cause students to struggle to navigate and utilize the tools and resources available to them for their learning. It can also impact their ability to effectively communicate and collaborate with others. One instructor emphasized the need for coordinated efforts to utilize existing resources for staff and student training, stating, "I think [this college] has enough resources to use, to offer the necessary trainings in any language for staff and students; it is just the matter of coordinating, organizing what we have."

Instructors believe that community colleges can support instructors by integrating technology by providing better or more training, resources, and support services. Instructors should not assume that all students have technology skills and should provide information about resources and online learning options. Several instructors stressed the importance of not making assumptions about students' computer technology skills, and one stated that, "Instructors should not make assumptions about the technology skills of their students. Many students are not prepared or exposed to technology before coming to school, especially for non-traditional students and people retraining for new careers." The significance of basic computer skills for both instructors and students was echoed by another instructor, who expressed, "When students know how to use technology, it makes all of our lives better, and sets them up for success that lasts well beyond graduation."

Instructors also acknowledged the presence of a considerable number of students without basic computer skills, particularly among non-traditional students. One instructor highlighted the challenge of catering to students with diverse backgrounds and experience levels, stating, "My students are both first-year and second-year students with a variety of backgrounds, experience, and education levels." Another stated “I often assume that students are a lot more skilled than they actually are. Some students are adept at social media, though those skills are a bit different than the computer technology needed in a classroom or class setting. Curiosity can quickly make these transferable skills.”

Student Digital Storytelling Projects

The stories from the students were as moving as they were interesting. A total of 11 students volunteered to participate in the digital storytelling project in some capacity. The majority opted to be audio recorded with my assistance, and others chose to create independently. Students shared personal experiences and perspectives that took great vulnerability and courage. I received three digital storytelling projects that were created independently and submitted to me by email with an attachment, a link, or uploaded directly to me to a privately shared Google folder. Only one included a voice narration. Two digital projects were organized as images and text. I also had an opportunity to meet in person with a class via invitation from an English instructor. After a brief workshop outlining the details of the study and completing informed consent, I began audio recording each student as they boldly shared their stories of computer technology and literacy. The final meetings with students to collaborate on their digital project were with ESL Spanish students, one in person and three via Zoom. Figure 5 features quotes selected from the students’ digital projects, interviews, and personal stories they were bold and vulnerable to share.

Figure 6

Quotes from Digital Storytelling Projects and Interviews with Students

We are in the digital age where the intersection of technology and education impacts students' learning experiences. This research seeks to uncover their challenges and triumphs in navigating the technological landscape by centering the students' and instructors' voices. As we interpret and understand these qualitative findings, I aim to illuminate the diverse perspectives and unique narratives to provide valuable insights into the wide range of ways in which students and instructors engage with and integrate computer technology into their daily lives and educational journeys. The names are an alias of the participants represented in the following statements in order to maintain their anonymity. In the exploration of experiences of students with technology, their voices emerge through insightful quotes from both digital storytelling projects and interviews, shedding light on the diverse narratives within the digital age. Only 10 students opted to share demographic information. Of the students who provided demographic information,

five were between the ages 18-25 and five were 26-49. Four participants spoke English as a second language and one reported being a first-generation college student. The following experiences shared by student participants paint a picture of students' interactions with computers, their various challenges, triumphs, and diverse experiences that shape their current computer skills.

Preston articulated the challenges of adapting to online education, stating, It's not all ways, rainbows, sunshine with computers. Let's just say I struggled adapting to a purely online form of education. It's one thing to use computers as a way to learn. It's another to have that be solely your way to learn. Especially since half teachers I knew didn't exactly know what they were doing teaching online."

Katherine provided a historical perspective, tracing her technology journey from the 1980s, involving the Dos version of WordPerfect, and its evolution in the professional world and shared:

> My technology journey started in the 1980s in elementary school, in an IBM computer lab where I played games like the Oregon Trail Game and typing test games in the fifth grade, I was awarded a certificate for typing 80 words per minute in middle school. And high school programs, like the Dos version of WordPerfect. it has evolved over the years in the professional world, I have worked mainly for car dealerships that use industry specific DMS software.

Tristin recalled early encounters with computers in elementary school, highlighting a formative experience in a word processing class.

Selena, also and ESL student, reflecting on learning to use computers as a child in Mexico, noted the absence of computers in schools, emphasizing the reliance on paper and said,

“So, I learned too to use a computer when I was a child in Mexico. I learned as much it was possible for me because in our schools we won't have a computer. So, it was everything on paper and that's what we use on class, no computers. At my job, I never work using computers.” [Translated Español to English]

Timothy's experience was easier than some other participants by having a computer-savvy friend, stating that “Easiest thing, luckily for me, was learning how to do it because my friend…was a computer whiz… his family had like computers, laptops, all sorts of cool stuff. …so, when I would always go over there and hang out and learn how to do that. And the hardest thing, apparently, is how to turn it off.”

Key Findings from Student Digital Storytelling Project and Interviews

Presented below are three themes that emerged from interviews and digital storytelling projects from students. Following the three themes are data showing statements and quotes taken directly from students in Figure 5 below.

Theme 1. Students who speak English as a Second Language (ESL) often lack basic skills and need translated in their native language. There were 6 ESL students who participated in this study. Out of the student assessment respondents (n = 33), the ESL students performed lower on both the basic computer skills and Windows assessments.

I gained access to student participants through direct partnership with the instructor. Willing instructors forwarded the invitation to students in their class or posted the information via an announcement in the learning management system (LMS). Two instructors who forwarded the invitation either taught a class of students with diverse ESL backgrounds or taught students who only spoke Spanish. Although students expressed interest in participating during a visit to their in-person class, I was met with hesitation from the students due to lack of access to computers at

home, availability due to work schedules, concern about their lack of technical skills, and most importantly, the language barrier. Lucia, an ESL student facing the abrupt shift due to the pandemic, reflected, "It was super tricky for me…to begin with…I had never touched a computer. It was chaos for me." She expressed a desire for more support in her language. It was chaos for me. So, I did not give up, I continued…the truth is that I would like there to be that support and more in our language." [Translated: Español to English]

Language was a barrier in my time visiting one of the ESL instructor's remote class via Zoom. The instructor was instrumental to the success of conveying the message by translating in real-time my presentation in Spanish. There were 6 students who volunteered from this class to participate in the study where language continued be a barrier when engaging with the participants individually.

Theme 2. Lack of early age exposure to computers, barriers access to computers and technology, and, limited resources effect academic success. Responses from all three samples indicate barriers to access in their experience either academically or personally while engaged with the community college in some capacity. Students reported the increased difficulty of progressing in their classes with limited resources and without computer skills necessary to navigate learning management systems or complete assignments using common programs such as word processing, presentation and spreadsheets. Administrators, students, and instructors, through interviews, open-ended surveys, and digital storytelling, addressed the concern of access either to technology at one or more stages in their life experience. Administrator open-ended survey results indicated there is an ongoing systemic issue that isn't unique to the college regarding barriers and access to computers and the internet, and there are more efforts that are needed at the administrative level to overcome and serve the students who are most impacted by it.

Theme 3. Alternative digital devices and technology compensate for lack of basic computer skills. A common response from the student participants is that they have turned to alternatives to the traditional desktop or laptop computers, such as digital devices like iPads and iPhones to compensate for a lack of basic computer skills. This can be attributed to the fact that they are accessible and affordable, they can be used to take notes, they are portable, in addition to other reasons. Students use them as a more practical and efficient way to engage in academic or educational activities. Nathan candidly shared his struggles with computers such as with typing, opting for writing papers on his phone and sending them to his email sharing "My earliest memory with computers was not a good one. I had gotten frustrated with the computers and I knocked it to the ground. I say that's probably my biggest struggle, I peck. I don't actually really know how to like type. When I have a paper, do I type it on my cell phone, in my notes, I'll write my whole paper in my notes. Then I'll send it to my email."

Teresa's technology journey intertwined with a history of heart wrenching personal challenges, as she shared,

> I endured a 13-year marriage characterized by severe abuse. During episodes of anger and rage, he destroyed multiple laptops, cameras, and phones, resulting in the loss of cherished photographs…an iPhone 5, despite its limitations, it served as my lifeline for crucial tasks. Presently, my array of technology includes an iPad, iPhone, Apple Watch, and a laptop accompanied by an additional monitor, mouse, and keyboard.

Her present suite of technology serves as a testament to resilience.

Making the Connection

The connected findings of this study are key for answering two research questions in this study: (1) *How accurate are these assumptions in reflecting the actual computer literacy skills of*

students and instructors? and *(2). What is the experience of community college students about their use of technology in the educational setting and their personal life?* Table 10 provides a single location where student mastery levels on certain skills can be compared with the administrator assumptions about their mastery of those skills. As can be seen in Table 10, the actual skills that students demonstrate align with the expectations that administers have of those skills. The data displayed in Table 10 is a subset of the complete list of assessment skill criteria that are worth noting (see Appendix G). This table shows the number of responses for each skill and the mean score separated by not mastered and mastered in the first two columns. The third column shows the mean rating of agreement for each skill from the administrator online survey. The mean is calculated from Likert ratings ranging from (1) *strongly disagree* to (5) *strongly agree*. An average score of three on this scale would indicate that a neutral response from administrators about whether they agreed that students had that skill or not. Anything lower than three indicates that the administers do not believe that students will have that skill.

Table 10

Comparison of Student Actual Basic Computer Skills and the Administrator Likert Survey Response to the Statement "First-year Students Have Basic Computer Skills."

Student Basics Computer Skills Assessment	Not Mastered	Mastered	Administrator Assumption Mean
Identify specific computer hardware (system unit, monitor, printer, keyboard, mouse or touchpad, ports, touchscreen)	6 (77.1)	27 (90.9)	3.59
Demonstrate knowledge of keys on keyboard (Enter, Shift, Control, Backspace, Delete, Arrow Keys, Tab, Caps Lock, Number Lock)	18 (84.8)	15 (92.8)	3.32
Identify mouse pointer shapes and the functions they represent (spinning wheel (loading), (text), arrow (basic clicking), hand pointer (clickable links)	19 (84.0)	14 (93.3)	3.14
Drag and drop	1 (59.50)	32 (89.4)	2.95
Utilize common controls for screen interaction (selecting checkboxes, using drop-down menus, scrolling)	19 (84.9)	14 (93.3)	3.05
Identify icons on desktop	3 (71.1)	30 (90.2)	2.91
Demonstrate understanding that it is possible to customize a computer for increased accessibility (customizing a mouse for left-handed use and sensitivity, and changing screen resolution on a monitor)	17 (83.7)	16 (93.5)	1.95

Note. n = 33. The table shows a value of total respondents for each category that either mastered or did not master that skill with it corresponding average score. The mean is calculated based on Likert rating ranging from (1) *strongly disagree* to (5) *strongly agree.*

Key Findings of Administrator Assumption and Student Basic Computer Skills Score

According to Table 10, the findings of the data shows that administrators indicate a surprisingly strong assumptions (m = 1.95) that students would not be able to demonstrate understanding that it is possible to customize a computer for increased accessibility. According to the student results, however, students were more mixed in their actual abilities in this area. Administrators indicated a neutral to low agreement with their expectations that the students would understand knowledge of keys on a keyboard and their ability to identify mouse pointer shapes and related tasks. However, results show that the student performance on these tasks are

more evenly distributed. Administrators were relatively negative in their assumptions about students' ability to identify icons on a desktop. Assessment results, however, show that very few students were not able to do this task.

Summary

Using a sequential explanatory mixed-method design, this study was an exploration to understand the difference between community college administrator assumptions of the computer literacy skills of instructors and students and the actual basic computer skills. The study was conducted in Phase I quantitative and Phase II qualitative methods. This chapter presented the findings of the administrator online survey, digital literacy assessments, and themes generated from qualitative open-ended question surveys, follow-up interview with administrators, digital storytelling, and the connected findings between the results. Chapter 5 provides an interpretation of the results, implications for practice and recommendations for future research.

Chapter 5: Discussion, Interpretations and Recommendations

Introduction

I chose computer literacy as the focus of this study because I believe it redirects attention to a critical issue that often goes unnoticed in the context of community colleges and higher education at large. My choice is grounded in the assumptions that I have had, and currently, hold regarding community college students and community college instructors.

Current literature and research address the persistent digital divide, particularly for economically disadvantaged and underserved communities. As explored in Chapter 2, the term *digital divide* is often associated with access to the internet and information, and I argue basic computer literacy should be included in this crisis. Institutional research departments and governmental agencies provide statistics and data concerning digital technology access across the United States and abroad. Jaggars et al. (2021) emphasized data that shows in the days of the pandemic "college students might be assumed to be on the 'good side' of the digital divide and to enjoy seamless technology access; however, the emergency transition to online learning quickly called that assumption into question" (p. 2). This data often points to the lack of access to internet connectivity. Yet, what this data sometimes fails to capture are the voices of those who are marginalized.

The structure of this study is divided into five chapters. Chapters 1 – 4 provide a comprehensive discussion of the problem, review of the literature, methodology, and the findings. This fifth chapter will be a discussion, interpretation, and connections to prior literature of the results presented in Chapter 4. Following the discussion, I will present the implications, opportunities for future research, and recommendations. This study is guided by the following research questions:

- RQ 1: What are the common assumptions made by community colleges about the computer literacy skills of students and instructors?
- RQ 2: How accurate are these assumptions in reflecting the actual computer literacy skills of students and instructors?
- RQ 3: How do community college students experience computer technology in the educational setting and their personal life?

Because making inaccurate assumptions about computer literacy skills is an issue that can have short-term and longer-term impact, "institutions of higher education cannot assume that all students arrive at colleges and universities with the technical skills needed to be effective [learners]" (Stafford & Stinton, 2016 as cited in Graham, 2021, p. 2). College administrators may assume that community college students and instructors have sufficient computer skills and computer literacy to navigate and utilize technology, but the assumptions may be inaccurate. This assumption can lead to a lack of resources and support for individuals who require additional training and resources to succeed in the digital age.

In this study, I intended to emphasize not only the individual human experience but also the shared human experience. Reich (2009) wrote, "Problems must be examined in the cultural context of thought acquired in education. It is best developed out of experienced activities in which we learn something about ourselves and our world" (p. 60). This study returns the attention back to an ongoing but understated issue in community colleges. Computer literacy (or the lack of it) can be the difference between a smooth experience in community college and a frustrating one. Individuals who are computer literate are considered more employable and provide pathways to access resources.

I am passionate about amplifying the voices of those who are often lost in the sea of data, voices that reveal the reality of computer literacy. The views of Stahl and King (2020) resonated with me when they state that "reading reports of qualitative research can be a highly variable experience and a given set of data is collected and shared, different writers can generate unique outcomes" (p. 26). The conclusions I draw from this data may differ from the reader. What I hope all can deduct from the study is that the results indicate that there are student populations and instructors who are navigating the educational system without even the most basic computer skills. These skills, including tasks as fundamental as using a mouse, understanding how the components of an operating system work, and managing files and folders, can't be taken for granted.

What's more troubling is that some individuals may not have the courage to ask for help. Leahy and Dolan (2010) explain that for many people the computer is not a natural tool, even causing fear of doing something wrong, of breaking the machine, of getting lost online, and they need guidance on what is required to have more confidence using the technology. During the pandemic, when teachers and students were forced to rely on technology for teaching and learning, the disparities became glaringly evident and uncovered the reality that there remain barriers to access to technology outside of the classroom including personal computers or reliable broadband or internet connectivity. As indicated in a report by Richards et al. (2021), not all students thrived; many struggled. It became apparent that simply providing students with laptops or Chromebooks, even with COVID-19 federal funding, was insufficient if they didn't know how to operate them effectively. This struggle extended to teachers and instructors with low computer literacy, who also had difficulty navigating the systems, and this, in turn, affected their ability to support their students effectively. Disparities that surface for instructors may include the varying

ability to integrate computer technology seamlessly and efficiently into their teaching. This also hindered their ability to help bridge the skills gaps of their students. An example of one of the understated, often overlooked, issues that warrants attention (addressed further in the discussion of findings) is the experience of English as a Second Language (ESL) learners and teachers. A lack of training or instructional guides in their native language to learn or operate computers exists, creating a disparity or division in skills when they navigate the community college systems, and are asked to navigate learning management systems or submit assignments using a computer. Some of these individuals had minimal access to computers during their childhood, further exacerbating the gap. Addressing the disparities is critical to ensure that all community college students have the basic skills to matriculate their educational experience successfully.

Summary of Key Findings of this Study

In this study, the research was conducted in two phases, Phase I Quantitative and Phase II Qualitative. The connected findings from the results of Phase I and Phase II provide a much deeper insight into assumptions and the actual skills of students and instructors. Below is a summary of key findings grouped by one of the three research questions.

Administrator Assumptions about Computer Literacy Skills. The first research question aimed to uncover the common assumptions made by community colleges about the computer literacy of students and instructors. The results from the Phase I online survey showed that 69% of administrators assume that instructors have basic computer skills when they are hired. The results showed administrators were mixed in their assumptions of first-year students. Only 39.1% had positive assumptions and 60.8% did not or were neutral. Multiple responses from follow-up interviews and survey open-ended questions from administrators and instructors show a shared-assumption that first-year community college students do not have basic computer skills.

An example of this perception is evident in this statement “Most community college students come from a minoritized or underserved background, therefore, my assumption is that some of them may lack exposure to the technology used.” Conversely, there is an opposite positive assumption that instructors do have basic computer skills when they are hired. As one administrator stated, “I assume most community college instructors can turn on a computer, navigate a browser, and utilize an email system.”

The Accuracy of Assumption vs. Actual Skills. The second research question explored the accuracy of assumptions versus the actual computer literacy skills of students and instructors. Students (n = 33) and instructors (n = 14) completed two Northstar Digital Literacy assessments: Basic Computer Skills and Windows [OS]. Scores that are 85 and above met the mastered level criteria. Student participants average scores on the Basic Computer Skills and Windows assessment were 88.9 and 86.2 respectively. Instructors average scores were higher on the basic computer skills (95.3) and lower on the Windows score (88.9). There are two skills that neither students nor instructors mastered:

1. Demonstrate knowledge of keys on keyboard, and
2. Utilize common controls for screen interaction.

RQ 3 Findings: Experiences of Community College Students. The third research question explored the experience of community college students using technology in the educational setting and their personal life. There were four themes that emerged from the qualitative Phase II interviews and open-ended questions with administrators and open-ended questions with instructors.

- Theme 1: Administrators believe lacking computer literacy skills can negatively impact a student's academic success.

- Theme 2: Administrators assume that the level of basic computer skills varies depending on educational background, socioeconomic status, and age.
- Theme 3: The lack of basic computer literacy can hinder learning and create barriers for students who have been underserved by the system.

The key themes highlight the impact that lacking computer literacy skills can have on academic success, how varying levels of basic computer skills can be influenced by educational background and socioeconomic status, and the potential barriers created for underserved students who lack basic computer skills.

Selecting a participatory visual and digital methodology to underpin this study led to a creative approach by inviting participants to share their experiences through digital storytelling. The following three themes emerged from both the digital storytelling projects and informal semi-structured interviews with students:

- Theme 1: Students who speak English as a Second Language (ESL) often lack basic skills and need customized instruction in their native language.
- Theme 2: Lack of early age exposure/access to computers, access to technology, and limited resources effect academic success.
- Theme 3: Alternative digital devices and technology compensate for the lack of basic computer skills, providing a workaround for some students.

These themes indicate that by addressing the specific needs of ESL students, improving access to technology, and exploring alternative digital devices can contribute to enhancing overall academic success.

Discussion and Implications

Community colleges serve a crucial role in both rural and suburban communities to serve a diverse range of students and instructors, including learners and teachers who, as shown in the results, had little to no exposure to computer technology skills during their early years at home or in school. Though definitions of computer (digital) literacy widely vary, Leahy and Dolan (2010) provide a definition of digital literacy that resonates and lists having basic knowledge of technology, the ability to search and locate information, the ability to know when there is a problem, basics of hardware and software, send/receive an email with or without attachments, and communicating using mobile devices as the critical competencies for computer skills.

The mixed level of skills of students and instructors shown in this study can be a result of diversity in backgrounds and experiences. It is easy to take for granted that not every student entering college possesses the basic computer skills needed for participate fully in technology reliant academic settings (Cox, 2009). The largely positive assumption about instructors' computer skills reflects some level of expectations from administrators that instructors need these skills to navigate systems and tools such as email, learning management systems, and Microsoft products for example. The expectations aren't monitored as administrators reported they either do not know how or if students' or instructors' skills are measured prior to hiring or in some cases there simply are no computer literacy questions asked or assessment given during the hiring process. However, according to Santos et al. (2013), research on digital literacy shows that there are approaches that have been used to 'measure' the digital literacy of higher education students from asking students their perception of their own skills to developing instruments that measure their actual skills.

The Indeed Editorial Team (2023) defines computer literacy as the level of expertise to use computers efficiently, including basic knowledge of how to power a computer on and off, learning keyboard commands, or operating common software systems and platforms. The results of this study also suggest that students and instructors each have strengths and weaknesses in different skills that demonstrate computer literacy. For example, they mastered certain areas (e.g., identify specific computer hardware or Identify icons on desktop) but did not master others (e.g., log off, shut down computer). These differences in mastered/not mastered based on the findings, are related to their prior learning experiences or needs of application of the technology in their personal lives. The findings of this study indicate similar results to the Santos et al. (2013) data analysis suggesting there is variation in students' online skills consistent with the idea that even among young adults with access to connectivity, use of technology doesn't always mean meaningful use.

Language Barriers and ESL Students. The ESL community college students in the study who had limited access to computers during their formative years struggled with basic computer skills. Additionally, these and other culturally diverse students "have wide variations in their previous exposure to computers-some are extremely proficient, while others have never used a computer until they are required to do so for college related activities in the U.S" (Cox, 2009, para. 4). In addition to the state of computer literacy for ESL communities, Mamedova, & Pawlowski (2018) reports on national data in the U.S. Department of Education 2018 Stats in Brief that "non-native born adults could be more likely than native-born adults to lack digital literacy skills, native-born adults could nonetheless make up a relatively large proportion of the adults who lack these skills" (pp. 3-4).

The ESL participants in this study credited specific instructors for support. Frustrations and challenges highlight the importance of having customized, tailored support and resources in the native language for these specific student (and instructor) populations.

The results of this study reflect findings in prior studies that show "some people are excluded; often caused by social, economic or accessibility issues" (Leahy & Dolan, 2010, p. 210), there is an ongoing need for equitable access to technology and computer literacy resources. Community colleges must address these disparities to ensure all students have the opportunity to thrive. The results of this study indicate that there is still a concerning gap between what is assumed about computer literacy skills and the actual skills demonstrated by the students. These gaps can have grave short-term and long-term implications for student performance, but are often an afterthought due to misconceptions about the technology skills students actually have (Swaak, 2022). This points to the importance of aligning curriculum and instructional methods to bridge this gap effectively.

Instructor Support Systems and Engagement. In this study, instructors expressed the importance of having access to professional development and training in computer literacy. The findings show they have the basic skills, therefore training and support may be tailored to ensure instructors are up-to-date with evolving technology and pedagogical practices. One of the most interesting findings involved students who cited their reliance on alternative digital devices and technology (e.g. iPad, smartphones) to compensate for their lack of computer skills, no access to a desktop or laptop computer, mental/medical disabilities, or personal preference. The operating systems and functions of mobile devices, for example, do not have the same processing power or speed of standard desktop/laptop computers. The workaround to use mobile devices exclusively can have longer-term impact that is not explored in this study. According to qualitative responses

from students in Jaggars et al. (2021) study, students indicated that the university-provided iPad was their primary device for completing coursework with a student commenting that the iPad was their only computer-like device available due to campuses being closed and "I am living at home with no computer access and no laptop" (p. 8).

Instructors have an opportunity to reflect on and examine their own assumptions about student computer skills to further guide and inform teaching practices. It is important for administrators to create open and safe spaces for engagement and knowledge sharing for instructors. These can be in the form of facilitated peer learning sessions where instructors have open dialogue about experiences and share insights in a supportive setting. They can be in the form of workshops, trainings, and other professional development opportunities that facilitate robust discussions and activities that encourage instructors to explore their own assumptions and their basic computer literacy skills and those of students. Finally, consider developing specialized professional development courses or online modules that focus on the Windows operating system and other advanced computer skill areas as a practical approach to pedagogical strategies to integrate technology successfully.

Impacts Beyond the Classroom

The importance of computer literacy goes beyond the classroom. It has a profound impact on transferable skills that apply from the early education system to secondary education, and professional settings. I observed the quality of instructional design in online courses suffered greatly during the pandemic, and I firmly believe that low computer literacy skills played a significant role in this. Fundamental concepts and tasks associated with desktop computer hardware lay the foundation for all the digital and information literacies that follow. This includes

high-level concepts like generative artificial intelligence and other advanced networks and systems that rely on a solid understanding of computer hardware.

There are implications for how community colleges approach addressing computer literacy moving forward. It is evident that computers are integral to educational programs, whether for the development of instructional content by instructors or the access and submission of assignments by students. The absence of even basic computer skills can lead to negative and frustrating experiences for students, impacting the quality of their work and, ultimately, the outcomes of their courses. Data from the U.S Department of Education Stats in Brief (2018) report "across the countries studied, 71 percent of adults use a computer at work and 83 percent of adults use a computer in everyday life. In comparison, 74 percent of U.S. adults use a computer at work" (p. 4). With the increasing integration of technology in education, it is essential to understand the level of computer skills and computer literacy among community college students and instructors and examine the assumptions made by college administrators regarding technology skills to identify potential disparities and address gaps in technical proficiency. As Jaggars et al. (2021) eloquently state:

> Regardless of demographic or academic background, technology inadequacy creates an academic struggle for students and threatens their academic success. As a result, current continuity planning may have the unintended consequence of magnifying inequities among students who are already marginalized. (p. 10)

In emergency situations that impact normal business operations or inhibits students from accessing Wi-Fi or internet on campus, institutional leaders must ensure that their continuity of operation plan includes a plan that serves all students who rely on broadband or internet to access academic activities.

Opportunities for Future Research

While this research study has taken a deep dive into community college administrators' assumptions and implications surrounding basic computer skills among community college students and instructors, there are several opportunities to expand these ideas for future research. These potential research directions offer opportunities to explore more deeply the intricate connections between basic computer skills and online teaching and learning, and the path to advanced fields like artificial intelligence and computer science.

Impact of Basic Computer Skills on Online Teaching and Learning

A compelling area for further investigation would be a dedicated study on the direct influence of basic computer skills on the efficacy of online teaching and learning in the community college setting. This research could examine how students' proficiency with foundational computer basics and digital tools impacts their engagement, performance, and satisfaction in online courses. It would also be valuable to explore instructors' experiences and perceptions of teaching online courses, particularly regarding their students' computer literacy levels.

Computer Literacy as a Pathway to Artificial Intelligence (AI) Technologies and other STEM Fields

Educators may build on the findings that basic computer skills serve as a springboard to advanced applications in fields like artificial intelligence and computer science. Future research could delve into the specific pathways and prerequisites for students pursuing these career paths or disciplines. Investigation of how a solid foundation in computer literacy influences students' preparedness and success in computer science programs or AI-related courses could provide valuable insights into the curriculum design and technical support systems at community colleges.

Long-Term Effects of Computer Literacy Support Programs

Another intriguing area of study would be to conduct a mixed-method study to assess the long-term impact of implementing proactive supports beginning at the admissions or in the hiring phase such as a basic computer literacy programs, one tailored for students and one tailored for new faculty and instructors. Mansfield (2017) established that placement exams were originally designed to determine whether a student was college ready. Scott-Clayton (2012, as cited in Mansfield, 2017) found that "placement exams only predicted the student's success rates in core subjects, such as math and English, disregarding the other skills required to be prosperous in college, such as soft skills and computer literacy skills" (p. 24). This research could track students who received remedial computer skills training and evaluate their grades, academic achievements, and whether students successfully transfer to four-year institutions or directly into the workforce. Conducting research with such focus could better indicate what are the lasting benefits of investing in basic computer skills training and programs.

Instructor Computer and Digital Training and Its Impact

The findings of this study indicate that instructors may require training specific to the operating systems used by their students. Future research could explore the effectiveness of tailored instructor training programs. Investigating whether such training enhances instructors' ability to address their students' unique computer literacy needs and whether it contributes to improved learning outcomes would be of great significance.

The Digital Divide and Computer Literacy

An essential aspect that warrants further research is examining equity and access issues related to computer literacy education in community colleges. Exploring disparities in computer

literacy based on factors such as age, culture and language, and assessing the effectiveness of interventions to close these gaps contribute to fostering a more inclusive educational environment.

The digital divide remains an essential and influential concept, shaping and reshaping the level and types of disparities among underserved populations. The digital divide is a challenge faced worldwide since the introduction of computer and digital technologies. The root causes of the digital divide are not one directional. There are several factors that contribute to this growing problem. A study by Sanders and Scanlon (2021) arguing that the digital divide is a human rights issue emphasizes the critical need for digital inclusion that includes but is not limited to "affordable hardware, technical literacy training, and technical support" (p. 139). The authors further explain that strategies for digital inclusion "that are affordable and culturally appropriate digital literacy programs are also necessary support programs in local communities, and identifying and making available clear pathways to access online information in many languages spoken in diverse communities" (Sanders & Scanlon, 2021, p. 139).

The challenges stem from something other than the technology itself. A systematic, collaborative partnership, which is central to participatory visual research, is becoming integral to work toward closing the digital divide. It was crucial to examine the assumptions made by college administrators regarding technology skills to identify potential disparities and recommend strategies to develop and implement practices early to mitigate deficiencies in computer literacy. Assessing a student's basic and fundamental computer ability should be a central tenet of computer and digital literacy research. The findings of this study will also give a greater insight into the competency areas that should be considered during the recruitment of instructors and faculty.

Recommendations

It is my hope that this study will jump start new conversations that spur actionable strategic initiatives that address the reality of computer literacy for community college students and educators. The research has emphasized and prioritized the utter importance of revisiting the foundational basics of computer literacy, which serve as a crucial springboard for students' progression into more advanced applications of digital literacy concepts, educational pathways to computer science fields, and the dynamic realm of artificial intelligence. To address these challenges and move forward, I recommend that community college administrators take more intentional, proactive measures.

First, mechanisms should be developed to assess or determine the computer skills of incoming students during the admissions process and prospective faculty during the hiring phase. Institutions should strongly consider developing a budget plan to invest in the hiring of bilingual staff in both the student services and technical support areas. Employing available digital tools that allow for resources for students and instructors to be distributed and available in both English and Spanish. Resources must extend beyond the standard printed material, but be supplemented by video resources with voiceover in Spanish (for example, an investment in 3rd party translation services that are built into the institutional budget allocations). This assessment will serve as a guide to identifying the need for intervention or remedial learning opportunities.

Furthermore, it is imperative to incorporate basic computer skills training and support programs for both faculty and students in multiple modes and languages. These programs should also be designed with intentionality, ensuring that they address the specific needs identified through the assessment process. By doing so, community colleges can empower their instructors

and equip their students with the foundational computer literacy skills necessary for success in an increasingly technology-driven society.

Ideally, this study will be a catalyst that drives further interest and incentive for community college administrators to recognize the importance of fundamental basic computer literacy and technology proficiency. By proactively assessing and enhancing these skills, institutions can ensure that their students and faculty are well-prepared for the challenges and opportunities presented by the technology era.

Conclusion

The choice to base my research on basic computer literacy skills stems from my belief that it signals a deeper issue that extends beyond the educational system. Rather, it is a glaring sign that indicates larger issues in local communities. However, the consequences are far-reaching for underserved, marginalized individuals who still need the attention and support but can be hidden or overlooked in local, regional or national student data. Higher percentages in data can present a false picture that there is not a problem. However, the individuals who are not represented in the data continue to experience barriers, limited resources for support, and are less prepared or competitive for higher-earning jobs. Because community college leaders' decisions are data-driven, it makes it imperative to bring attention to their needs in order for them to receive the level of support and reverse this trend. By returning the focus back to these foundational computer skills, we can empower individuals to not only navigate the digital world but also to thrive in an increasingly technology-driven society. It is a critical step toward bridging the digital divide and ensuring that no voice goes unheard in the ever-evolving landscape of education and beyond.

This investigation and exploration of the accuracy of the assumptions of community colleges about the computer literacy skills of students and instructors creates opportunities to place greater value on the fundamental computer literacy skills. These assumptions, whether accurate or inaccurate, often align with or underpin curriculum design, teaching methods, and resource allocation. If assumptions about computer literacy are inaccurate, resources may not be allocated appropriately. By determining the actual skill levels of students and instructors, community colleges can allocate resources more effectively, directing funding and support where it is most needed to foster a technologically proficient learning environment. By examining the accuracy of these assumptions, educators can take additional steps to tailor their instructional strategies to better meet the actual needs and abilities of their students and instructors. This can lead to an increase in effective teaching and learning outcomes.

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Appendix A

Permission to Reuse Evolution of Digital Literacy Terminology

9/5/23, 10:21 PM Appalachian State University Mail - Reuse permission request

Mountaineer APPS

Katrina Boone [redacted]@appstate.edu>

Reuse permission request

2 messages

Katrina Boone <[redacted]@appstate.edu> Thu, Mar 30, 2023 at 11:29 AM
To: journaleditor@igi-global.com, cust@igi-global.com, marketing@igi-global.com

Hello,

I am a doctoral candidate at Appalachian State University in NC and I am currently writing my dissertation proposal that focuses on computer literacy. I am referencing one of the articles published by your journal (see below) and would like to use Figure 1. Evolution of digital literacy terminology in my proposal.

Boechler, P., Dragon, K., & Wasniewski, E. (2014). Digital literacy concepts and definitions. *International Journal of Digital Literacy and Digital Competence*, *5*(4), 1–18. https://doi.org/10.4018/ijdldc.2014100101

Could you please assist me with this? Thank you in advance.

Katrina Boone

(Shared) Customer Service <cust@igi-global.com> Thu, Mar 30, 2023 at 11:55 AM
To: Katrina Boone [redacted]@appstate.edu>, "(Shared) Journal Editor" <journaleditor@igi-global.com>, IGI Global Marketing <marketing@igi-global.com>

Dear Katrina,

Thank you for your e-mail. As long as it is properly cited, it can be used.

Please let me know if you have any questions.

Kind regards,

Nicole

https://mail.google.com/mail/u/0/?ik=0929c001a9&view=pt&search=all&permthid=thread-a:r-4415124520433879 45&simpl=msg-a:r-4398599645317365 21&simpl=msg-f:1761820083544572149 1/2

Appendix B

Research Study Procedure

Principal Investigator: Katrina Boone
Department: Leadership and Educational Studies
Contact Information:
Faculty Advisor:
Faculty Advisor Contact:

Study Procedure

The estimated time to complete the survey is 30 minutes to one hour. Estimated time to complete interviews is one hour. The estimated time to complete computer skills assessments and visual digital data
collection is a total of 3-6 hours.

1. **Identify and contact potential participants:** The first step would be to work with the instructors
and administrators to identify potential student participants who are willing to take part in the study. The study could be advertised in class, via email, or through other means. Students who are interested in participating could then be asked to provide their contact information and sign a consent form.

2. **Obtain informed consent:** Informed consent should be obtained from all participants before any
data is collected. Participants should be provided with information about the study, including the purpose, methods, potential risks and benefits, and the right to withdraw at any time. Participants should be given the opportunity to ask questions and to sign a consent form.

3. **Conduct interviews and computer skills assessment with instructors:** The instructors who are
involved in the study should be interviewed to gather information about their perspectives on the study and to obtain information about the students. The interviews could be conducted in person, by phone, or online, depending on the preferences of the instructors and the availability of resources.

4. **Administer a survey to administrators:** The administrators who are involved in the study should be given a survey to complete. The survey could include questions about the goals of the study, the potential benefits and risks, and any concerns that the administrators may have.

5. **Participatory visual and digital data collection and computer skills assessment with students:** The students should be invited to participate in a participatory visual and digital data collection process. This could involve using cameras, video/audio recorders, and other digital tools to capture the experiences of the students. The students could be asked to take pictures, record videos, or write short narratives about their lived experiences in or outside of class.

6. **Collect and analyze data:** The data collected from the interviews with instructors, the survey administered to administrators, and the participatory visual and digital data collected from the

students should be compiled and analyzed. The data could be analyzed using qualitative methods, such as thematic analysis or grounded theory, to identify patterns and themes in the data.

7. Disseminate findings: The findings of the study should be disseminated to the participants and other stakeholders, such as the school administration and other researchers. The findings could be presented in a report, a presentation, or a series of articles. The participants should be given the opportunity to provide feedback on the findings and to ask questions about the study.

Appendix C

Informed Consent

I am asking you to participate in a research study titled Challenging Assumptions: Investigating Community College Administrators' Perceptions of Computer Literacy among Students and Instructors, and Their Technology Experiences Bridging the Gap: Exploring Administrator Assumptions and Student/Instructor Experiences with Computer Technology in Community College. I will describe this study to you and answer any of your questions. This study is being led by Katrina Boone, Doctor of Education in Educational Leadership at Appalachian State University. The Faculty Advisor for this study
is Dr. Patrick O'Shea, Department of Instructional Technology at Appalachian State University.

What the study is about
This research aims to understand and explore whether community college administrators make accurate assumptions about incoming students and community college instructors' foundational or basic computer literacy skills. In addition, community college instructors make assumptions about their student's academic preparedness and computer skills that may need to match their capabilities. To hold this position and serve its students, the two-year institution must develop strategies that command success in all facets of institutional technology integration. Computer skills and computer literacy among community college students and instructors are significant issues that can hinder academic achievement and cause more difficulty in online and remote learning environments and professional development.

What we will ask you to do
1. Take an online computer basics assessment and a Windows system assessment (approximately 10-15 minutes per assessment). You will submit a copy of both assessment score summaries.

2. A digital media storytelling project: Work together with the researcher to share your experiences with computer literacy and technology through digital storytelling. You will also work with the researcher to select the devices and type of media data each student will create digital storytelling as part of the study's activities. Document your experiences and perspectives as visual digital data in the forms of voice, images, and video (2-5 hours), Participants will have the option to meet on campus or create content in their personal environment, or partner with other participants. The estimated total time commitment will be 1-5 days to complete the activities.

Risks and discomforts
I do not anticipate any risks from participating in this research.

Benefits
Participation in this study may provide a possible indirect benefit of reflecting on an experience that may lead to a better understanding of oneself. There are no identified direct benefits to participating in this study. This study has the potential to generate new knowledge that can be used to inform policies and practices

that support student success in computer literacy, both in community colleges and in broader society. The benefits of this study extend beyond the individual participants to educators, administrators, policymakers, and the broader community by promoting access and equity in computer literacy education.

Incentives for participation
Participants will not receive any financial compensation for commercial and/or non-commercial (as appropriate) uses of the images/recordings.
This study uses a participatory visual and digital research collection method that includes audio recordings, video/film, images, and other digital media published as an online magazine or eBook. Upon completion of the research data will be archived after transcription or editing and destroyed after 5 years.

Privacy/Confidentiality/Data Security

What will be done to keep my information confidential?
You may choose to be identified by name in the study or to be identified using a pseudonym. You may also permit the audio and video recordings of your image and voice to be used in presentations and publications, or you may request that these materials not be published or shown. You may change your decision at any point in the study.
If you choose to be identified using a pseudonym, other participants will be asked to refer to you using that pseudonym. If you choose to be identified by a pseudonym and ask that recordings not be used in publications and presentations, every effort will be made to keep your study-related information confidential.

How will privacy and/or confidentiality be protected?
Data will be protected in accordance with the permissions given.
Identifying information will be kept separate from research data (e.g., signed consent forms will be kept separate from the survey data, and the two will not be connected)
Identifying information will not be collected for surveys, and all survey data will be confidential, including job titles and employers.
The researcher will have exclusive access to identifying information.
All data collected will be password-protected in a secure cloud server.

Indicate your preference for the use of audio and video recordings.
Please initial one option:
_____ I give my permission for the use of my recorded image and voice in presentations and publications.
_____ I prefer my recorded image and voice not be used in presentations or publications.

Online Data Collection Applications:
We anticipate that your participation in this survey presents no greater risk than everyday Internet use.
Please note that the assessment(s)/skills test [is/are] being conducted with the help of NorthStar Digital

Literacy, a company not affiliated with Appalachian State University, and with its own privacy and security policies that you can find on its website. We anticipate that your participation in this skills test presents no greater risk than everyday use of the Internet.

Email communication:
Please note that email communication is neither private nor secure. Though [I am/we are] taking precautions to protect your privacy, you should be aware that information sent through e-mail could be read by a third party.

Future Use of Identifiable Data Collected in this Research
Identifiable information will not be used for future research without obtaining your consent.

Taking part is Voluntary
Participants' involvement is voluntary. Participants may refuse to participate before the study begins, discontinue at any time, or skip any questions/procedures that may make him/her feel uncomfortable, with no penalty to him/her/them and no effect on their academic standing, record, or relationship with the college or other organization or service that may be involved with the research.

Follow-up studies
We may contact you again to request your participation in a follow-up study. As always, your participation will be voluntary, and we will ask for your explicit consent to participate in any of the follow-up studies.
May we contact you again to request your participation in a follow-up study? Yes/No

If you have questions
The principal researcher conducting this study is Katrina Boone, a graduate of Appalachian State University. Please ask any questions you have now. If you have questions later, contact Katrina Boone at (email and phone redacted). If you have any questions or concerns regarding your rights as a subject in this study, you may contact the Human Subjects Institutional Review Board (IRB) at 828-262-4060 or access their website at https://researchprotections.apstate.edu/human-subjects. You may also report your concerns or complaints anonymously through Research Protections online at https://researchprotections.appstate.edu/contact/report-concern or by calling 1-828-262-8557. Participants will be given a copy of this consent upon request.

Statement of Consent
By signing below or electronically indicating your consent, you acknowledge that you have read and understood the Informed consent for students and the information provided in this consent form. You have had the opportunity to ask questions and have received satisfactory answers. You voluntarily agree to participate in the study, and you understand that you can withdraw at any time without any negative consequences. The researcher will keep this consent form for five years beyond the end of the study.

Indicate your preference for the use of audio and video recordings.
Please check one option:
I consent to begin the study, I wish to participate.

I do not consent, I do not wish to participate.

Please check one option:

I give my permission for the use of my recorded image and voice in presentations and publications.

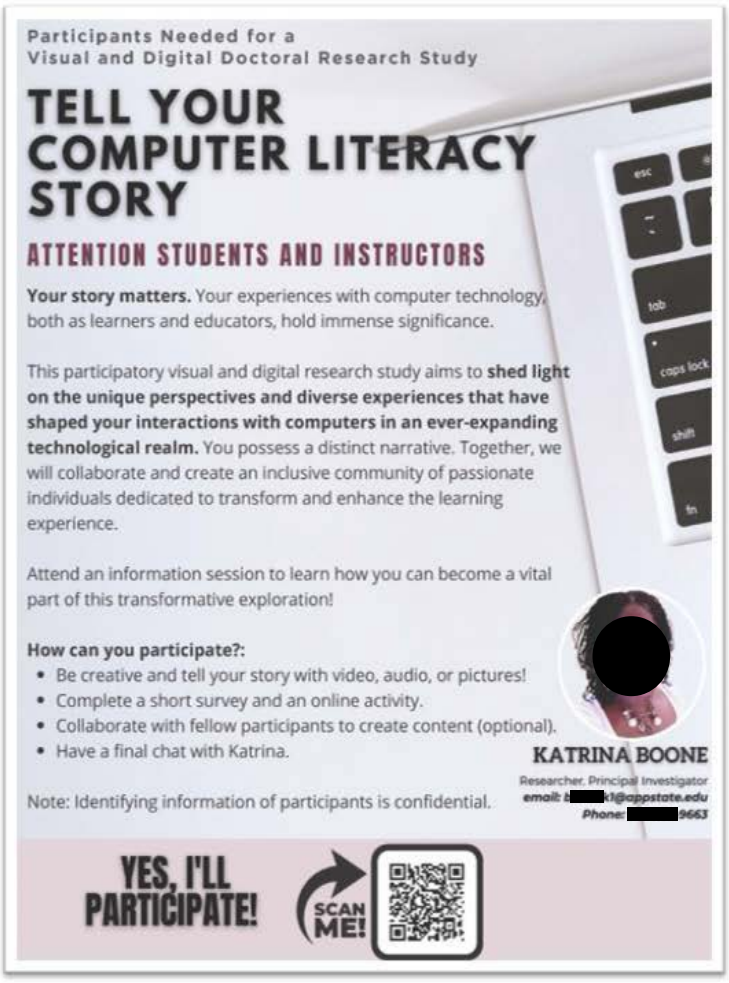
I prefer my recorded image and voice not be used in presentations or publications.

Printed Name _____ Date _____

Signature _____ Date

Appendix D

Email Invitation and Flyers



[redacted]!

You (and your students) are invited to participate in my doctoral research study. I am in the final stages of my doctoral program, and my goal is to complete the program this December! There are three ways instructors (and/or students) may participate in this study:

1. **Take a short survey:** Click Here to Start the Survey Note: Please check all of the appropriate selection(s) to the question "Which best describes you" question at the start of the survey to ensure the correct experience. For example, "I am a continuing community college instructor" or "I am a community college student."

2. **Complete 2 Online Assessments:** Basic Computer Skills and Windows. Take each one **only once.** To submit your results/score, go to the top right of the browser, click on the 3 vertical dots, and Select Print; the destination is Save as PDF. Please send both score/summary pages as an attachment to katrina.boone@clackamas.edu.

3. **Tell your Computer Literacy lived experience using digital storytelling**: This is an opportunity to be creative! This can be a photo slideshow with voice narration, film your work/personal computer environment with audio narration, or use social media reels with gifs and memes to share your experiences. I can help brainstorm with you or assist you with the tools you might need!

I am happy to answer any questions you have. Have a wonderful evening!

Warmest regards,

Katrina Boone

1

[redacted]!

I hope this email finds you well. As you may have heard, I am in the research stages of my doctoral program at Appalachian State University.

I am writing to invite you to participate in a my research study titled "**Challenging Assumptions: Investigating Community College Administrators' Perceptions of Computer Literacy among Students and Instructors, and their Experiences with Computer Technology.**" This study will also seek to understand the experiences of students with computer technology in anticipation that these deeper level insights will better inform the development of strategies that command success in all facets of institutional technology integration.

To participate in this study, you will complete a short Community College Administrator Survey on Computer Literacy. **The survey should take approximately 15 – 20 minutes of your time.**

Your participation is voluntary, and you may withdraw from the study at any time without penalty. The study is approved by the Institutional Review Board (IRB) of Appalachian State University, and all data will be kept strictly confidential.

If you are willing to participate in this study, **please complete the survey by July 15, 2023** at the following link: **Katrina Boone Doctoral Study Administrator Survey**

Thank you for your time and consideration.

Katrina Boone

Doctoral Candidate, Appalachian State University
boonek@appstate.edu

Appendix E

Online Survey (via Qualtrics)

Welcome to the research study!

To begin this study, you will be presented with an informed consent form that must be reviewed and signed. Your responses will be kept confidential.
Then, you will be asked to answer questions that will help customize your user experience.

In this study, I am interested in understanding community college students' experience with computer technology and college administrators' assumptions of the computer literacy skills of students and instructors. Your participation in this research is voluntary. You have the right to withdraw at any point during the study. The Principal Investigator of this study, Katrina Boone, can be contacted at @appstate.edu. You must be at least 18 years of age. You may choose to terminate your participation at any time for any reason.

Which of the answers below describe you? (Select all that apply)

I am a community college administrator.
I am a first-year student at a community college
I am a community college instructor.
I am a continuing student at a community college
English is not my first language
I am the first one in my immediate family to attend college.
I am between ages 18-25
I am between ages 26-49
I am over age 50
I graduated from high school recently (less than 2 years ago)

Administrator Section 1

Please read and download the complete Informed consent for administrators before proceeding to the next step. I am asking you to participate in a research study titled Challenging Assumptions: Investigating Community College Administrators' Perceptions of Computer Literacy among Students and Instructors, and Their Technology Experiences. I will describe this study to you and answer any of your questions. This study is being led by Katrina Boone, Doctor of Education in Educational Leadership at Appalachian State University. The Faculty Advisor for this study is Dr. Patrick O'Shea, Department of Instructional Technology at Appalachian State University.

What the study is about
This research aims to understand and explore whether community college administrators make

accurate assumptions about incoming students and community college instructors' foundational or basic computer literacy skills. In addition, community college instructors make assumptions about their student's academic preparedness and computer skills that may need to match their capabilities. To hold this position and serve its students, the two-year institution must develop strategies that command success in all facets of institutional technology integration. Computer skills and computer literacy among community college students and instructors are significant issues that can hinder academic achievement and cause more difficulty in online and remote learning environments and professional development.

What we will ask you to do

I will ask you to complete an online survey that asks questions about your assumptions and perceptions of the basic computer literacy skills and Windows computer skills of both your students and instructors. Completion of the survey will take approximately 10-20 minutes.

If you have questions

The principal researcher conducting this study is Katrina Boone, a graduate of Appalachian State University. Please ask any questions you have now. If you have questions later, contact Katrina Boone at @appstate.edu or call 9663. If you have any questions or concerns regarding your rights as a subject in this study, you may contact the Human Subjects Institutional Review Board (IRB) at 828-262-4060 or access their website at https://researchprotections.apstate.edu/human-subjects. You may also report your concerns or complaints anonymously through Research Protections online at https://researchprotections.appstate.edu/contact/report-concern or by calling 1-828-262-8557.

Please enter your first and last name.

By signing below or electronically indicating your consent, you acknowledge that you have read and understood the Informed consent for administrators
and the information provided in this consent form. You have had the opportunity to ask questions and have received satisfactory answers. You voluntarily agree to participate in the study, and you understand that you can withdraw at any time without any negative consequences.

☐ I consent to begin this study

☐ I do not consent, I do not wish to participate

The survey will take approximately 10-20 minutes to complete. The survey includes both open-ended questions and a series of questions or statements.

Let's begin the survey.

Administrator Section 2

1. How would you define basic computer literacy in the context of community college students and faculty?

2. What assumptions do you have about the basic computer literacy skills of community college instructors?
3. What assumptions do you have about the basic computer literacy skills of first-year community college students?
4. How do you measure and assess the basic computer literacy skills of community college students and/or faculty? How do you think computer literacy skills impact academic preparedness and student success in community college?

For the following questions, please rate your level of agreement with each statement.

(1) Strongly Disagree (2) Disagree (3) Neutral (4) Agree (5) Strongly Agree

1. First-year students at this community college already have basic computer skills.
2. First-year students at this college already have advanced computer skills.
3. Faculty and/or instructors at this college have basic computer skills upon hiring.
4. Faculty and/or instructors at this college have advanced computer skills upon hiring.
5. First-year students' level of computer skills affects their academic performance.
6. Faculty/Instructors' level of computer skills affects their ability to teach effectively.
7. I am satisfied with the current computer skills training and resources provided to students and faculty or instructors at my community college?

Administrator Section 3

How confident are you of first-year students have mastered the following basic computer skill areas?

(1) Not at All (2) Slightly (3) Moderately (4) Very Much(5) Extremely

1. Operate a computer using a Windows Operating System
2. Identify the operating system used by a computer.
3. Identify the parts of the Windows 10 interface (desktop, taskbar, etc.).
4. Demonstrate ability to search for a file, program, or document.
5. Identify icons, functions, and any file extensions related to basic office software (Word, PowerPoint, and Excel) and default Windows programs (Microsoft Edge, Windows Defender, etc.).
6. Start and exit programs.
7. Minimize and maximize windows.
8. Open, close and switch between windows.
9. Demonstrate knowledge of Windows File Explorer and identify drives on the computer, and cloud storage services (e.g., OneDrive).
10. Move documents and files, including to and from Recycle Bin.
11. Use Settings to uninstall or modify apps.
12. Demonstrate knowledge of the Windows Start Menu, including Get Help.

13. Shut down, restart, and log off the computer.

How confident are you of first-year students have mastered the following basic computer skill or function?

(1) Not at All (2) Slightly (3) Moderately (4) Very Much(5) Extremely
1. Distinguish between different types of devices (tablets, desktop and laptop computers)
2. Identify specific computer hardware (system unit, monitor, printer, keyboard, mouse or touchpad, ports, touchscreen)
3. Log on to and shut down a desktop computer or laptop.
4. Demonstrate knowledge of keys on keyboard (Enter, Shift, Control, Backspace, Delete, Arrow Keys, Tab, Caps Lock, Number Lock)
5. Identify types of mice: mouse and touchpad
6. Identify mouse pointer shapes and the functions they represent (spinning wheel (loading), text, arrow (basic clicking), hand pointer (clickable links)
7. Demonstrate knowledge and appropriate use of mouse clicks (right-click, left-click, and double click)
8. Drag and drop.
9. Utilize common controls for screen interaction (selecting check boxes, using drop-down menus, scrolling)
10. Access and control audio output features (volume, mute, speakers, and headphones)
11. Identify icons on desktop.
12. Demonstrate understanding that it is possible to customize a computer for increased accessibility (customizing a mouse for left-handed use and sensitivity, and changing screen resolution on a monitor)
13. Identify mechanisms for storing files (flash drives, hard drives, cloud-based storage)
14. Identify whether a computer is connected to the internet.
15. Identify and locate camera and mic on laptops, tablets.
16. Turn computer and monitor on and off.
17. Demonstrate ability to trash and retrieve items using the trash or recycle bin.
18. Demonstrate understanding that software programs are upgraded periodically to fix bugs and increase utility, and that different versions may be installed on different computers.

Instructors Section 1

Please Read and download the complete Informed consent for instructors before proceeding to the next step. I am asking you to participate in a research study titled Challenging Assumptions: Investigating Community College Administrators' Perceptions of Computer Literacy among Students and Instructors, and Their Technology Experiences. I will describe this study to you and answer any of your questions. This study is being led by Katrina Boone, Ed.D. student in Educational Leadership at Appalachian State University. The Faculty Advisor for this study is Dr. Patrick O'Shea, Department of Instructional Technology at Appalachian State University.

What the study is about
This research aims to understand and explore whether community college administrators make accurate assumptions about incoming students and community college instructors' foundational or basic computer literacy skills. In addition, community college instructors make assumptions about their student's academic preparedness and computer skills that may need to match their capabilities. To hold this position and serve its students, the two-year institution must develop strategies that command success in all facets of institutional technology integration. Computer skills and computer literacy among community college students and instructors are significant issues that can hinder academic achievement and cause more difficulty in online and remote learning environments and professional development.

What we will ask you to do
1. Take an online computer basics assessment and a Windows system assessment (approximately 10-15 minutes per assessment). You will submit a copy of both assessment score summaries.
2. Complete a questionnaire that asks a series of open-ended questions regarding your perceptions of your own computer skills and your perceptions of the students' basic computer skills (approximately 30 min).

If you have questions
The principal researcher conducting this study is Katrina Boone, a graduate of Appalachian State University. Please ask any questions you have now. If you have questions later, contact Katrina Boone at (email and phone number redacted). If you have any questions or concerns regarding your rights as a subject in this study, you may contact the Human Subjects Institutional Review Board (IRB) at 828-262-4060 or access their website at https://researchprotections.apstate.edu/human-subjects. You may also report your concerns or complaints anonymously through Research Protections online at https://researchprotections.appstate.edu/contact/report-concern or by calling 1-828-262-8557.

By signing below or electronically indicating your consent, you acknowledge that you have read and understood the Informed consent for instructors
and the information provided in this consent form. You have had the opportunity to ask questions

and have received satisfactory answers. You voluntarily agree to participate in the study, and you understand that you can withdraw at any time without any negative consequences.

☐ I give my permission for the use of my recorded voice in presentations and publications.

☐ I do not give my permission for the use of my recorded voice in presentations and publications.

☐ I consent to begin this study

☐ I do not consent, I do not wish to participate

Please (Print) enter your full name.

_____

Instructors Section 2

We will now begin the questionnaire portion of the study. Please answer the following open-ended questions. This should take 15-30 minutes to complete.

1. Tell me about your experience integrating computer technology in your teaching?
2. Tell me about your academic and professional background, including your experience teaching first-year community college students?
3. Describe your experience using computer technology in your personal and professional life before teaching at a community college?
4. Tell me about your experience integrating computer technology in your teaching?
5. What technology skills are expected of your students and what assumptions do you make regarding their basic computer literacy (technology) skills?
6. Tell me your thoughts about basic computer literacy skills and the impact on learning experiences?
7. What steps do you think community colleges can take to support instructors in integrating computer technology in their teaching?
8. What else would you like to share?

This is the end of the questionnaire portion of this study. Please now proceed to take two online assessments at the following links. Please go to Print then choose Save As PDF your first attempt score and summary page to your computer and email a copy for both assessments to @appstate.edu.

Instructor Section 3

Take the Essential Computer Skills -Basic Computer Skills Assessment
Take the Essential Computer Skills -Windows Assessment

Informed Consent for Students

Please read and download the complete Informed consent for students before proceeding to the next step. I am asking you to participate in a research study titled Challenging Assumptions: Investigating Community College Administrators' Perceptions of Computer Literacy among Students and Instructors, and Their Technology Experiences. I will describe this study to you and answer any of your questions. This study is being led by Katrina Boone, Doctor of Education in Educational Leadership at Appalachian State University. The Faculty Advisor for this study is Dr. Patrick O'Shea, Department of Instructional Technology at Appalachian State University.

What the study is about
This research aims to understand and explore whether community college administrators make accurate assumptions about incoming students and community college instructors' foundational or basic computer literacy skills. In addition, community college instructors make assumptions about their student's academic preparedness and computer skills that may need to match their capabilities. To hold this position and serve its students, the two-year institution must develop strategies that command success in all facets of institutional technology integration. Computer skills and computer literacy among community college students and instructors are significant issues that can hinder academic achievement and cause more difficulty in online and remote learning environments and professional development.

What we will ask you to do
1. Take an online computer basics assessment and a Windows system assessment (approximately 10-15 minutes per assessment). You will submit a copy of both assessment score summaries.
2. A digital media storytelling project: Work together with the researcher to share your experiences with computer literacy and technology through digital storytelling. You will also work with the researcher to select the devices and type of media data each student will create digital storytelling as part of the study's activities. Document your experiences and perspectives as visual digital data in the forms of voice, images, and video (2-5 hours),

Participants will have the option to meet on campus or create content in their personal environment, or partner with other participants. The estimated total time commitment will be 1-5 days to complete the activities.

If you have questions
The principal researcher conducting this study is Katrina Boone, a graduate of Appalachian State University. Please ask any questions you have now. If you have questions later, contact Katrina

Boone at (email and phone number redacted). If you have any questions or concerns regarding your rights as a subject in this study, you may contact the Human Subjects Institutional Review Board (IRB) at 828-262-4060 or access their website at https://researchprotections.apstate.edu/human-subjects. You may also report your concerns or complaints anonymously through Research Protections online at https://researchprotections.appstate.edu/contact/report-concern or by calling 1-828-262-8557.
Please enter your name.

_____

Please enter your email address.

_____

By signing below or electronically indicating your consent, you acknowledge that you have read and understood the Informed consent for students and the information provided in this consent form. You have had the opportunity to ask questions and have received satisfactory answers. You voluntarily agree to participate in the study, and you understand that you can withdraw at any time without any negative consequences.

☐ I consent to begin this study

☐ I do not consent, I do not wish to participate

☐ I give my permission for the use of my recorded image and voice in presentations and publications.

☐ I do not give my permission for the use of my recorded image and voice in presentations and publications.

Thank you for your participation in this study! The next step is to begin your digital and visual project. Doctoral study next steps students digital project. Your project should be completed no later than July 31, 2023.

The 2nd and final step to your participation will require a short in-person or virtual meeting with me. You will need access to a computer. I am happy to meet on campus if you do not have a computer at home. We will discuss a time and location that works best for you.

Appendix F

Administrator Online Survey: All "What is your Level of Agreement with the following Statements" Responses

Field	(1) Strongly Disagree	(2) Disagree	(3) Neutral	(4) Agree	(5) Strongly Agree	Total
1. First-year students at this community college already have basic computer skills.	0	7	7	7	2	23
2. First-year students at this college already have advanced computer skills.	4	11	6	2	0	23
3. Faculty and/or instructors at this college have basic computer skills upon hiring.	0	1	6	15	1	23
4. Faculty and/or instructors at this college have advanced computer skills upon hiring.	0	10	9	4	0	23
5. First-year students' level of computer skills affects their academic performance.	0	0	1	9	13	23
6. Faculty/Instructors' level of computer skills affects their ability to teach effectively.	0	0	0	11	12	23
7. I am satisfied with the current computer skills training and resources provided to students and	1	10	6	6	0	23

Field	Min	Max	Mean	Standard Deviation
1. First-year students at this community college already have basic computer skills.	2.00	5.00	3.17	0.96
2. First-year students at this college already have advanced computer skills.	1.00	4.00	2.26	0.85
3. Faculty and/or instructors at this college have basic computer skills upon hiring.	2.00	5.00	3.70	0.62
4. Faculty and/or instructors at this college have advanced computer skills upon hiring.	2.00	4.00	2.74	0.74
5. First-year students' level of computer skills affects their academic performance.	3.00	5.00	4.52	0.58
6. Faculty/Instructors' level of computer skills affects their ability to teach effectively.	4.00	5.00	4.52	0.50
7. I am satisfied with the current computer skills training and resources provided to students and faculty or instructors at my community college?	1.00	4.00	2.74	0.90

Appendix G

Northstar Digital Literacy Assessment Skills Criteria

Basic Computer Skills Criteria

This badge holder passed an assessment of the standards listed below by scoring at least 85% on an unproctored exam on the Northstar Digital Literacy website.

Learners taking unproctored assessments are not supervised.

Basic Computer Skills Standards

1. Distinguish between different types of devices (tablets, desktop and laptop computers)
2. Identify specific computer hardware (system unit, monitor, printer, keyboard, mouse or touchpad, ports, touchscreen)
3. Log on to and shut down a computer
4. Demonstrate knowledge of keys on keyboard (Enter, Shift, Control, Backspace, Delete, Arrow Keys, Tab, Caps Lock, Number Lock)
5. Identify types of mice: mouse and touchpad
6. Identify mouse pointer shapes and the functions they represent (spinning wheel (loading), iBeam (text), arrow (basic clicking), hand pointer (clickable links))
7. Demonstrate knowledge and appropriate use of mouse clicks (right-click, left-click, and double click)
8. Drag and drop
9. Utilize common controls for screen interaction (selecting check boxes, using drop-down menus, scrolling)
10. Access and control audio output features (volume, mute, speakers and headphones)
11. Identify icons on desktop
12. Demonstrate ability to trash and retrieve items using the trash or recycle bin
13. Demonstrate understanding that it is possible to customize a computer for increased accessibility (customizing a mouse for left-handed use and sensitivity, and changing screen resolution on a monitor)
14. Demonstrate understanding that software programs are upgraded periodically to fix bugs and increase utility, and that different versions may be installed on different computers
15. Identify mechanisms for storing files (flash drives, hard drives, cloud-based storage)
16. Identify whether or not a computer is connected to the internet
17. Identify and locate camera and mic on laptops, tablets
18. Turn computer and monitor on and off

ABOUT
Overview
Timeline & History
FAQs

FEATURES
Assessments
Northstar Online Learning (NSOL)
Curriculum
Northstar Standards

PRICING
Pricing
Joining
Benefits

FIND A NORTHSTAR LOCATION
Map
Why Take at a Northstar Location?

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Northstar Digital L
A program of Literacy Min
700 Raymond Avenue, Su
St. Paul, MN

Windows Criteria

This badge holder passed an assessment of the standards listed below by scoring at least 85% on a proctored exam at a Northstar Digital Literacy location.

Learners taking proctored exams are asked for identification and take the assessment in a supervised setting.

Windows Standards

1. Identify the operating system used by a computer.
2. Identify the parts of the Windows 10 interface (desktop, taskbar, etc.).
3. Demonstrate knowledge of the Windows Start Menu, including Get Help.
4. Demonstrate ability to search for a file, program, or document.
5. Identify icons, functions, and any file extensions related to basic office software (Word, PowerPoint, and Excel) and default Windows programs (Microsoft Edge, Windows Defender, etc.).
6. Start and exit programs.
7. Minimize and maximize windows.
8. Open, close and switch between windows.
9. Demonstrate knowledge of Windows File Explorer and identify drives on the computer, as well as cloud storage services (e.g., OneDrive).
10. Move documents and files, including to and from Recycle Bin.
11. Shut down, restart, and log off a computer.
12. Use Settings to uninstall or modify apps.

Appendix H

Student Assessment Results by Skill and Mean Overall Score

Student Northstar Digital Literacy Computer Basics Assessments	Not Mastered	Mastered
1. Distinguish between different types of devices (tablets, desktop and laptop computers)	1 (59.5)	32 (89.4)
2. Identify specific computer hardware (system unit, monitor, printer, keyboard, mouse or touchpad, ports, touchscreen)	6 (77.1)	27 (91.1)
3. Log on to and shut down a computer	4 (77.6)	29 (90.0)
4. Demonstrate knowledge of keys on keyboard (Enter, Shift, Control, Backspace, Delete, Arrow Keys, Tab, Caps Lock, Number Lock)	18 (84.8)	15 (92.8)
5. Identify types of mice: mouse and touchpad	9 (82.8)	24 (90.6)
6. Identify mouse pointer shapes and the functions they represent (spinning wheel (loading), (text), arrow (basic clicking), hand pointer (clickable links)	19 (84.0)	14 (93.3)
7. Demonstrate knowledge and appropriate use of mouse clicks (right-click, left-click, and double click)	5 (80.4)	29 (89.9)
8. Drag and drop	1 (59.50)	32 (89.4)
9. Utilize common controls for screen interaction (selecting checkboxes, using drop-down menus, scrolling)	19 (84.9)	14 (93.3)
10. Access and control audio output features (volume, mute, speakers and headphones)	1 (87.0)	32 (88.5)
11. Identify icons on desktop	3 (71.1)	30 (90.2)
12. Demonstrate ability to trash and retrieve items using the trash or recycle bin	_	33 (88.5)
13. Demonstrate understanding that it is possible to customize a computer for increased accessibility (customizing a mouse for left-handed use and sensitivity, and changing screen resolution on a monitor)	17 (83.7)	16 (93.5)
14. Demonstrate understanding that software programs are upgraded periodically to fix bugs and increase utility, and that different versions may be installed on different computers	3 (84.9)	30 (88.9)
15. Identify mechanisms for storing files (flash drives, hard drives, cloud-based storage)	_	33 (88.5)
16. Identify whether or not a computer is connected to the internet	_	33 (88.5)
17. Identify and locate camera and mic on laptops, tablets	2 (82.1)	31 (88.9)
18. Turn computer and monitor on and off	7 (79.2)	26 (91.0)

Student Northstar Digital Literacy Windows [OS] Assessment		Not Mastered	Mastered
1.	Identify the operating system used by a computer.	3 (64.3)	29 (88.0)
2.	Identify the parts of the Windows 10 interface (desktop, taskbar, etc.).	14 (75.3)	18 (94.0)
3.	Demonstrate knowledge of the Windows Start Menu, including Get Help.	10 (70.4)	22 (92.8)
4.	Demonstrate ability to search for a file, program, or document.	4 (61.2)	28 (89.3)
5.	Identify icons, functions, and any file extensions related to basic office software (Word, PowerPoint, and Excel) and default Windows programs (Microsoft Edge, Windows Defender, etc.).	1 (66.0)	31 (86.5)
6.	Start and exit programs.	_	32 (85.8)
7.	Minimize and maximize windows.	8 (83.7)	24 (86.5)
8.	Open, close and switch between windows.	7 (78.6)	25 (87.8)
9.	Demonstrate knowledge of Windows File Explorer and identify drives on the computer, and cloud storage services (e.g., OneDrive).	6 (73.5)	26 (88.7)
10.	Move documents and files, including to and from the Recycle Bin.	6 (76.6)	26 (88.04
11.	Shut down, restart, and log off a computer.	12 (82.4)	20 (87.9)
12.	Use Settings to uninstall or modify apps.	13 (74.2)	19 (93.8)

Instructors Northstar Digital Literacy Basic Computer Skills Assessment	Not Mastered	Mastered
1. Distinguish between different types of devices (tablets, desktop and laptop computers)	_	14 (95.1)
2. Identify specific computer hardware (system unit, monitor, printer, keyboard, mouse or touchpad, ports, touchscreen)	4 (88.1)	10 (97.4)
3. Log on to and shut down a computer	3 (88.6)	11 (97.2)
4. Demonstrate knowledge of keys on keyboard (Enter, Shift, Control, Backspace, Delete, Arrow Keys, Tab, Caps Lock, Number Lock)	8 (92.7)	6 (97.5)
5. Identify types of mice: mouse and touchpad	1 (79)	13 (96)
6. Identify mouse pointer shapes and the functions they represent (spinning wheel (loading), iBeam (text), arrow (basic clicking), hand pointer (clickable links)	1 (79)	13 (96)
7. Demonstrate knowledge and appropriate use of mouse clicks (right-click, left-click, and double click)	_	14 (95.1)
8. Drag and drop	_	14 (95.1)
9. Utilize common controls for screen interaction (selecting checkboxes, using drop-down menus, scrolling)	4 (91.3)	8 (97.0)
10. Access and control audio output features (volume, mute, speakers and headphones)	_	14 (95.1)
11. Identify icons on desktop	_	14 (95.1)
12. Demonstrate ability to trash and retrieve items using the trash or recycle bin	_	14 (95.1)
13. Demonstrate understanding that it is possible to customize a computer for increased accessibility (customizing a mouse for left-handed use and sensitivity, and changing screen resolution on a monitor)	2 (91.8)	12 (95.8)
14. Demonstrate understanding that software programs are upgraded periodically to fix bugs and increase utility, and that different versions may be installed on different computers	_	14 (95.1)
15. Identify mechanisms for storing files (flash drives, hard drives, cloud-based storage)	_	14 (95.1)
16. Identify whether or not a computer is connected to the internet	_	14 (95.1)
17. Identify and locate camera and mic on laptops, tablets	_	14 (95.1)
18. Turn computer and monitor on and off	2 (84.4)	12 (97.2)

Instructors Northstar Digital Literacy Windows OS Skill Badge	Not Mastered	Mastered
1. Identify the operating system used by a computer.	_	13 (89.8)
2. Identify the parts of the Windows 10 interface (desktop, taskbar, etc.).	2 (76.7)	11 (90.8)
3. Demonstrate knowledge of the Windows Start Menu, including Get Help.	5 (78.8)	8 (94.7)
4. Demonstrate ability to search for a file, program, or document.	2 (70.4)	11 (91.9)
5. Identify icons, functions, and any file extensions related to basic office software (Word, PowerPoint, and Excel) and default Windows programs (Microsoft Edge, Windows Defender, etc.).	1 (89.6)	12 (88.5)
6. Start and exit programs.	_	11 (88.6)
7. Minimize and maximize windows.	3 (73.8)	10 (93.1)
8. Open, close and switch between windows.	2 (71.1)	11 (97.9)
9. Demonstrate knowledge of Windows File Explorer and identify drives on the computer, and cloud storage services (e.g., OneDrive).	1 (57.6)	12 (93.1)
10. Move documents and files, including to and from the Recycle Bin.	4 (80.7)	9 (92.2)
11. Shut down, restart, and log off a computer.	4 (81.8)	9 (92.1)
12. Use Settings to uninstall or modify apps.	3 (73.8)	10 (93.1)

Appendix I

Administrator Semi-Structured Follow-up Interview Questions

1. What strategies or resources does the institution currently have in place to support students who may have varying levels of computer literacy skills?

2. The data indicates that Spanish-speaking students whose first language isn't English scored lower on the computer assessments. Are there any initiatives or support systems aimed specifically at addressing this disparity?

3. What strategies or initiatives could be implemented to bridge the gap in computer literacy skills among students, particularly focusing on Spanish-speaking students? How can we create a more inclusive and supportive environment for them?

4. How might the survey results (or similar studies) influence administrative decisions related to allocating resources for technology-related support or training programs?

5. What collaborative measures between administrators, faculty, and support services do you believe would be most effective in enhancing the computer literacy skills of Spanish speaking students, while fostering an inclusive and positive learning environment for all?

6. Are there any plans to enhance student support (including language-specific support) or targeted interventions for students who are not fluent in English to bridge the gap in computer literacy skills?

7. How might this data inform or impact the institution's approach to assessing and addressing student needs in other areas?

8. Moving forward, what steps do administrators envision taking to ensure that all students, regardless of their linguistic background, have equitable access to and proficiency in computer literacy skills?

Vita

Katrina Lewis Boone was born in Goldsboro, NC, to Alton and Lillian Lewis. Katrina graduated from Eastern Wayne High School in 1994. Later in that year, she enrolled as a freshman to the University of North Carolina at Greensboro to study Business Marketing and Management, and in December 1998 she was awarded the Bachelor of Science degree. In the spring of 2009, she began study toward a Master of Science in Instructional Technology degree. The M.S. was awarded in summer 2011. In May 2020, Ms. Boone commenced work toward her Ed.D. in Educational Leadership at Appalachian State University.

Katrina has been working full-time in the higher education system for more than 21 years with the majority of that time in North Carolina. Ms. Boone continues as a full-time administrator in higher education, and currently resides and works in Oregon, United States.