Digital Classrooms: A Multiple Case Study

of Four Visually Impaired College Students' Challenges and Opportunities

A Dissertation

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DEDICATION

This dissertation is dedicated to my husband, Sidney, my children, Morgan and Tanner, and my mother, Becky Jefcoat. They have supported me through all of my educational and professional endeavors. To my husband, I greatly appreciate his never-ending patience. To my mother, I am grateful for her helping take care of my family and allowing me to focus my efforts on reaching my goal. To my children, I hope that I have taught them to pursue their goals and never quit.

This dissertation is also dedicated to all of the visually impaired individuals who seek to better their lives by continuing their education.

Lastly, I dedicate this to my late father, Raymond Jefcoat, who taught me the value of a strong work ethic.

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ABSTRACT

Access to the Internet and technology skills are essential to the success of college students. Electronic textbooks are replacing paper textbooks. Laptops are replacing pens, pencils, and paper. Electronic forms found on school websites are replacing long registration lines. Hyperlinks are replacing handouts, and face-to-face interaction with instructors is disappearing. While technological innovations are often considered progress, they do not come without challenges to those who rely on assistive technology for their participation in educational, work, and social activities. Rather than fostering inclusion, these challenges hold the potential to increase exclusion of certain groups of individuals including the visually impaired population.

The purpose of this qualitative dissertation research was to investigate the unique personal experiences of visually impaired college students. Using a multiple case-study research design, this study illuminates some of the challenges four blind or visually impaired college students faced with the increased focus on technology in their respective post-secondary educational settings. Participants were asked to recall and share their personal successes, challenges, and failures as they traversed through the technological world of higher education.

Two primary research questions guided this study: (1) How are the experiences with digital college classrooms perceived by visually impaired college students? (2) What obstacles do these college students face in accessing, completing, and submitting required assignments and how do they respond to those obstacles?

Using constant comparative analysis of the data through the data collection and review process, several recurring themes were identified. The recurring themes that

emerged from the interviews include the need for strong support systems for visually impaired students, professional development training for university staff on the unique and diverse needs of visually impaired students, and self-motivation and self-advocacy skills.

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CHAPTER I. INTRODUCTION

Access to the Internet and technology skills are essential to the success of college students (Howard, 1994; Kennard, 2001; Watson & Pecchioni, 2011). Regardless of whether the class is online, face-to-face, or a hybrid, technology is changing the educational landscape in post-secondary education (Whitesel, 2009). Paper textbooks are being replaced with electronic textbooks. Pens, pencils, and paper notes are being replaced with laptops. Long registration lines are being replaced with electronic forms found on the school's website. Handouts are being replaced with hyperlinks, and face-to-face interaction with instructors is disappearing (Longman & Green, 2011; Whitesel, 2009). This shift in modus operandi is reflective of new educational priorities (Whitesel, 2009). While technological innovations are often considered progress, they do not come without challenges to those who rely on assistive technology for their participation in educational, work, and social activities (Cook, 2007). Rather than fostering inclusion, these challenges hold the potential to increase exclusion of certain groups of individuals (Schmetzke, 2001). Using a multiple case-study research design, this study illuminates some of the challenges that blind and visually impaired college students face with this increased focus on technology in the post-secondary educational setting.

With the advancement of technology consumers share some common challenges and frustrations. Software crashes, hardware crashes, software upgrades, connectivity issues, commands and functions to learn, and even virus attacks (Whitesel, 2009) are among the many challenges that technology users face as technology evolves and advances. These challenges and frustrations may result in reduced user productivity (Lazar, Allen, Kleinman, and Malarkey, 2007). But additional challenges exist for those

individuals who rely on assistive technology due to a visual impairment (Mankoff,

Hayes, & Kasnitz, 2010). These individuals rely on assistive technology designed to help

them access words and pictures found in print such as textbooks, newspapers, and

magazines, and electronic media such as the Internet and television.

Statement of the Problem

A 2007 study by Lazar et al. examined the frustrations of 100 blind individuals as

they navigated websites using screen reader technology. As technology has evolved,

technology producers have attempted to make technology more accessible for individuals

with disabilities in more recent years. Although technology now offers access to

information for blind and visually impaired individuals that did not exist before the

electronic age (Alves, Monteiro, Rabello, Gasparetto, & de Carvalho, 2009; Cook, 2007;

Hanson, 2014; Kapperman & Sticken, 2000), accessibility challenges for students still

exist that stem from the increased focus on the use of computers and technology in

education (Cook & Hussey, 2002; Mankoff, 2010; Shinohara, 2006; Shinohara &

Tenenberg, 2007). These accessibility challenges are the problem at the heart of this

research.

As computers and electronic devices may be making life more convenient for

many people (Howard, 1994), college professors and administrators need to be aware of

the potential accessibility issues their assignments, presentations, assessments, and

resources may hold. While requiring the use of technology for the retrieval and

submission of assignments may meet institutional requirements, requiring the use of a

specific technology which may be inaccessible to a specific population of individuals

(those with visual impairments) is considered discrimination and is a violation of the

Americans with Disabilities Act of 1990 (ADA) and Section 504 of the Rehabilitation Act of 1973 (Section 504) (Perez & Ali, 2010).

Titles II and III of ADA address the requirements of both public and private colleges and universities regarding the needs of and accessibility for individuals with disabilities. These needs include equipment and technological devices that ensure equal access. Instructors should be mindful of unique circumstances that may exist within their classroom when dealing with digital media and should be accounted for by the teacher (Herro, 2015). Teachers must be flexible and mindful of the fact that what works in one classroom context, one course, or in one semester may not be effective in another (Whitesel, 2009). If tightly prescribed methods are not accessible to all students, their innovative methods may foster exclusion rather than inclusion (Cook, 2007; Power, Freire, Petrie, & Swallow, 2012; Schmetzke, 2001; Shinohara & Tenenberg, 2007). Yet compliance with such mandates continues to be a challenge as technology continues to evolve (Mankoff et. al., 2010; Schmetzke, 2001).

According to the Southeast Comprehensive Center (2016), as the focus on digital learning continues to grow, visually impaired students may fall further behind compared to their sighted peers. Although the Center's 2016 report focused on students in the K-12 setting, blind and visually impaired college students also face unique challenges associated with digital learning (*College Guide for Students with Visual Impairments*.) The unique problems and experiences visually impaired college students encounter in their attempts to navigate through the digital classroom environments in higher education are the focus of this dissertation research study.

While blind and visually impaired students rely on assistive technology such as screen readers, electronic braille note-takers and braille translation software to access digital material, Ferrell, Bruce, and Lucker (2014) indicate that aside from product reports and a few case studies, very little research involving assistive technology for the blind and visually impaired exists. They describe the research that deals with assistive technology for children and youth who use braille in their educational programs as emerging and further indicate that additional research is warranted due to the increasing use of technology in schools. Mankoff et al. (2010) and Hanson (2014) support this with their claims that the unique needs of assistive technology users warrant the need for additional research.

Whereas the accessibility challenges that are unique to blind and visually impaired students in the K-12 setting are addressed in research and in pedagogy, little research exists on this topic specific to students at the post-secondary level. This study examines an under-explored area of technology and computer usage as it applies to the blind and visually impaired college student users. Once we understand the problems these students face, we can better address solutions to ensure accessibility to the digital classroom environments. Therefore, this dissertation research adds to the body of qualitative literature that addresses the accessibility challenges that blind and visually impaired technology users face.

Purpose of the Study

The purpose of this dissertation research was to investigate the unique personal experiences of four visually impaired college students. Using a multiple case study design, I asked participants to recall and share their personal successes, challenges, and

failures as they traversed through the technological world of higher education. Through intensive interviews with college students who are blind or visually impaired I tried to capture their interpretation through an articulation of their lived experience (Rubin & Rubin, 2012) regarding access (e.g., computer access, access to braille materials, screen-reader usage) to instructional materials and any other possible accessibility issues associated with the format of their college-level coursework such as delivery of instruction and course requirements.

Two primary research questions guided this study: (1) How are the experiences with digital college classrooms perceived by visually impaired college students? (2) What obstacles do these college students face in accessing, completing, and submitting required assignments and how do they respond to those obstacles? Qualitative researchers Howard (1994) and Whitesel (2009) indicated individuals who are unable to use computers and technology effectively and efficiently may feel a sense of confusion, frustration, or anxiety. Although Howard (1994) claimed computers are no longer considered a luxury but are now essential for progress and survival, Cook (2007), Shinohara and Tenenberg (2007), and Williams (2013) denoted many of the digital technologies considered valuable to the sighted user are of no use to the blind and visually impaired user. This research is intended to help elucidate the claims that while college students with visual impairments who use technology and assistive technology may have similar experiences with technology, they have unique challenges as well (Mankoff, 2010; Nemeth, 1998; Shinohara, 2006; Shinohara & Tenenberg, 2007).

The purpose of this chapter of the dissertation research is to introduce the reader to the aim of the research and the problem under investigation. Definitions of

terminology commonly associated with blindness and assistive technology for individuals who are blind or visually impaired are provided in this chapter. Also included in this chapter are the delimitations and assumptions that may be associated with the study.

Overview of the Methodology

The purpose of this qualitative study was to explore and understand the complexities of the experiences of visually impaired college students with digital classrooms. More specifically, the intent was to capture the experiences of individual college students who are blind or visually impaired through narrative descriptions of their personal lived experiences as they remember and articulate them. Because the intent was to explore and describe the unique experiences of individuals rather than to quantify their experiences, to test hypothesis, or to control behaviors, I used qualitative research methodology for capturing and analyzing the data associated with this dissertation research project (Creswell, 2013; Merriam, 2009; Yin, 2011). An additional goal of this dissertation research project was to allow the voices of a small population of individuals to be heard by empowering them to tell their stories from their perspectives.

Research focusing on understanding the perspectives of the participants through rich narrative descriptions is consistent with qualitative research methods (Creswell, 2014; Rubin & Rubin, 2012). Through in-depth interviews, I explored the experiences, attitudes, beliefs, and opinions of the participants in an effort to help understand and accurately communicate their perspectives to others (Rubin & Rubin, 2012; Schumacher & McMillan, 1993). The choice to include multiple participants allowed for an analysis within and across participants and settings (Baxter & Jack, 2008). By compiling narrative descriptions from multiple participants, my goal was to create a portrait that

accurately depicted their unique experiences and perspectives (Creswell, 2013; Rubin & Rubin, 2012; Schumacher & McMillan, 1993; Yin, 2011) while simultaneously comparing and contrasting their experiences.

Qualitative case studies allow researchers interested in the experiences of an individual insight into his or her life (Merriam, 2009). A single case study could potentially limit the insight obtained by the researcher to the perspective or lens of the single participant (Baxter & Jack, 2008; Creswell, 2013). In order to explore the issues through multiple lenses, I used a multiple case study design. Consistent with qualitative multiple case study research design, I used a purposeful convenience sample (Gall, Gall & Borg, 2007; Schumacher & McMillan, 1993; Yin, 2011) to recruit and select four participants for the study. I based this participant selection method on several factors: 1) participants personally experienced the phenomena being explored (Gall et al., 2007; Yin, 2011); 2) participants were willing to participate in in-depth interviews in order to obtain rich descriptions of their experiences (Creswell, 2014; Gall et al, 2007; Rubin & Rubin, 2012; Yin, 2011); and 3) data saturation was needed (Rubin & Rubin, 2012).

The purposeful convenience sample of participants consisted of college students who were currently enrolled or had been enrolled within the past year in a college or university. This criteria included community colleges or four-year institutions, public or private colleges or universities. I solicited volunteers through a network of professionals including colleagues in the field of visual impairments. In addition to their college enrollment criteria, participants were required to be visually impaired to a degree they relied on assistive technology to access information and be willing to participate in the lengthy interview process. These criteria are consistent with essential criteria described

by Gall et al. (2007), Moustakas (1994), and Yin (2003) for participants to be selected in qualitative research studies. The methodology is described in greater detail in chapter three of this dissertation research.

Assumptions, Limitations, and Delimitations

This study was intended to capture and illuminate the participants' experiences and their perception about their ability to access required digital course content and fulfill the requirements of their coursework that require the use of technology. This study was not intended to be representative of the blind and visually impaired college student population in any particular university, geographic region, or of the population as a whole (Gall et al., 2007; Yin, 2011). This study was not intended to judge or evaluate any institution's compliance with ADA or Section 504.

Assumptions

As with any self-reported data, it was necessary to assume the participants were honest in their interview responses. However, the participants' responses could have been influenced by subjective reality (Bogdan & Biklen, 2007). For example, their present academic standing, their grades at the time of the interviews, recent accessibility challenges, or other learning experiences may have influenced their perception of reality at any given time and thus influenced their responses during the interviews.

Limitations

Although I assumed the participants were truthful with their accounts and recollections of their experiences, limitations with interviews existed. According to Creswell (2014) and Yin (2011), information obtained through interviews is indirect as it is filtered through the views of the participants creating a subjective reality.

Additionally, their knowledge is not fixed but is based on their ability to accurately remember and articulate their experience (Rubin & Rubin, 2012). Their perspectives may be limited. These factors have the potential to introduce some degree of bias into the research (Johnson & Christensen, 2012). As the researcher, I accepted their version of reality yet was cognizant of the notion multiple versions of reality may have existed and acknowledged reality cannot be measured (Rubin & Rubin, 2012; Yin, 2011).

Delimitations

The study was not intended to evaluate the technology or services provided by any university or their compliance with any applicable federal or state laws. I did not include participants from outside the state of Mississippi. Nor did I include the perspectives of university faculty and staff, vocational rehabilitation counselors, family members, or friends of the participants. The visually impaired population is diverse and, consequently, their needs are diverse (Lazar et al., 2007). Therefore, the results of this study are not intended to be representative of the full population of college students with visual impairments.

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Definitions and Clarification of Key Terms

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There are issues that arise when trying to define individuals as *blind* or *visually impaired*. In the early 1900's the federal government charged the American Medical Association (AMA) with the task of defining blindness for Social Security eligibility purposes. The AMA's definition became known as the legal definition of *blindness* (Corn & Koenig, 1996). The legal definition only takes into account distance vision, not near vision, yet most literacy tasks involve near vision (Koenig, 1996). Other terms associated with blindness and visual impairments include *functionally blind, visually*

impaired, low vision, and *partially sighted*. However, these terms are not clearly defined and are often interchangeable.

The Individuals with Disabilities Education Act (IDEA) defines *visually impaired* (including blindness) as "an impairment in vision that with correction, adversely affects a child's educational performance." IDEA further clarifies the term to include both partial sight and blindness. Therefore, there is no clear distinction between *visually impaired* and *blind* under IDEA. As a result, any student in the K-12 setting whose vision adversely affects his or her educational performance may be identified as "visually impaired" and eligible for services.

An individual with a disability as defined by ADA is one whose impairment substantially limits a major life activity. This includes a visual impairment. The Center for Disease Control and Prevention (CDC) and the World Health Organization (WHO) are among other organizations who have attempted to define a visual impairment. According to the Equal Employment Opportunity Commission (EEOC), the inconsistencies in definitions cause the reporting of statistics regarding blind and visually impaired individuals to be inconsistent. Therefore, for the remainder of this paper the terms *blind* and *visually impaired* will be used interchangeably to describe the participants in the study to reduce unnecessary repetitive wording.

Additional definitions worth noting for the reader's understanding of terminology throughout this paper are listed below.

Assistive technology refers to any item, piece of equipment, or product system used to assist an individual with a disability in performing daily living, work, or educational activities. Assistive technology does not have to be computer-related

technology to be considered assistive technology (Cook & Hussey, 2002; Presley & D'Andrea, 2008).

Braille translation software is software used to convert electronic text into braille for either paper (tactile) braille production or refreshable braille. Some software also allows for backwards translation so the braille user can produce printed materials (Presley & D'Andrea, 2008).

Constructivism is the philosophical idea that knowledge and reality are subjective and constructed through personal experience (Narayan, Rodriquez, Araujo, Shaqlaih & Moss, 2013).

Digital divide refers to the separation, or gap, between those who are successful technology users and those who are not, or those who have access to computers and those who do not (Hardesty, McWilliams, & Plucker, 2014; Kennard, 2001).

Digital literacy is a term used to describe the skills and abilities needed to successfully access and navigate computers and technology in order to obtain and use information (Kennard, 2001; Slagter van Tryon, 2013).

Nemeth Code is the braille code used for math and science notation (Presley & D'Andrea, 2008).

Paper braille refers to the traditional braille medium consisting of raised dots on thick papers such as that used in braille books (Presley & D'Andrea, 2008).

Portable braille note-takers can be considered personal digital assistants (PDAs) for the blind as they have different levels of functionality and allow the users to store and retrieve information (Cook & Hussey, 2002; Presley & D'Andrea, 2008).

Refreshable braille displays are electronic devices that translate computer text into braille using tiny pins that rise and retract to form the braille characters. Refreshable braille displays may be connected to desktop computers, notebooks or other devices either through cords or via Bluetooth technology. These devices cost users thousands of dollars (Cook & Hussey, 2002; Presley & D'Andrea, 2008).

Screen readers are software or accessibility features that read (speak) text that is on the screen using a speech synthesizer. Screen readers are the most popular assistive technology used by individuals with visual impairments (Lazar et al., 2007; Presley & D'Andrea, 2008).

Summary

Chapter one of this dissertation provided an introduction to the problems blind and visually impaired individuals have with access to digital materials. This study focuses on a small segment of the population of individuals with disabilities who use technology and assistive technology, the visually impaired and blind population. Two primary research questions guide this study: (1) How are the experiences with digital college classrooms perceived by visually impaired college students? (2) What obstacles do these college students face in accessing, completing, and submitting required assignments and how do they respond to those obstacles? Just like their sighted peers, blind and visually impaired students need access to computers and technology accompanied by the digital literacy skills required to be successful in school and in the workforce (Crudden, 2012; Kapperman & Sticken, 2000).

The origin of the term *legally blind* is explained in this chapter. Additionally, other terms are defined to help the reader better understand some of the terminology used

throughout this paper. Assumptions, limitations, and delimitations were also included. A

brief description of the methodology used in this research is included in chapter one but

is described in greater detail in chapter three.

CHAPTER II. REVIEW OF THE LITERATURE

The purpose of this qualitative dissertation research was to investigate the unique personal experiences of visually impaired college students in digital classrooms. Using a multiple case-study research design, this study illuminates some of the challenges that four blind or visually impaired college students faced with the increased focus on technology in their respective post-secondary educational settings. I conducted a review of research and literature on topics related to digital classrooms, assistive technology, visual impairments, constructivism, and qualitative case study research design and included those topics in this chapter.

I conducted literature searches using online search engines such as Google and Google Scholar. I also used database services provided by the Robert LeForge Library at Delta State University to locate and retrieve literature. The databases, Educational Resources Information Center (ERIC) and EBSO host were the primary databases utilized in this research. The researcher also had direct access to the Journal of Visual Impairment and Blindness (JVIB) through membership in the Association for Education and Rehabilitation of the Blind and Visually Impaired (AER). In addition to my personal collection of educational reference materials, I also used numerous websites including the United States Department of Education as sources of information included in the literature review.

This chapter is divided into five major sections. The first section describes the advantages and disadvantages that have resulted from the increased use of digital classrooms. The second section introduces the reader to some of the statistics and characteristics of the blind and visually impaired population. The third section describes

some of the assistive technology used by blind and visually impaired individuals and some of the challenges associated with the technologies. The fourth section provides summaries of several related research studies. One of these studies is a single case study of a female blind college student and her use of various technologies. Two studies described in this literature review focus on Canadian college students and their accessibility issues with educational technology. The fifth section discusses constructivism, the philosophical idea that serves as the theoretical framework for this research.

Digital Classrooms

Many college campuses now require their faculty to use online platforms to deliver instruction and assignments, administer assessments, post grades, and communicate with students (Whitesel, 2009). Syllabi, required readings, and other resources are often posted in these platforms rather than delivered to students in paper-format as previously done in traditional classroom settings. In-person classroom discussions are being replaced with on-line discussions. Class assignments may now include creating or accessing presentations using specific software, listening to podcasts, and watching videos (Presley & D'Andrea, 2008; Ricoy, Feliz, & Couto, 2013). Wesch (2009) describes this new teaching and learning environment as one where students become knowledge-able rather than merely knowledgeable. Yet successful engagement in these activities requires access to text-based, image-based, video-based, and audio-based formats (Hardesty et al, 2014; Presley & D'Andrea, 2008). Therefore, students who are blind or visually impaired may not have full access to graphical information or

may need special technology in order to access the information (Cook & Hussey, 2002; Kapperman & Sticken, 2000; Presley & D'Andrea, 2008).

There are numerous advantages to digital and virtual classrooms. Teachers can now save time by recording their lectures and replaying them to multiple classes rather than having to repeat the lesson multiple times. Digital classrooms may also provide consistency in the delivery of the information (Gullen & Zimmerman, 2013; Whitesel, 2009). While there are numerous advantages to digital and virtual classrooms, they are not absent their disadvantages. As virtual classrooms provide flexibility for students to learn and teachers to teach from a distance, the lack of personal interaction among students and between students and instructors can leave students feeling overwhelmed, anxious, or isolated (Knox, 2014; Whitesel, 2009).

The study conducted by Knox (2014) revealed the unintentional negative consequences of overcrowded on-line classrooms. Knox studied the dynamics of a five-week online class that included, at its highest point of enrollment, over 42,000 participants of which he labeled approximately half to be what he considered active course participants. Course participants were encouraged to watch videos and participate in discussions and debates. The results became unmanageable as 1430 discussion threads were created consisting of over 8000 posts. Words used by Knox's participants to describe their experiences included *techno-overload, overwhelming, confusing, random and superfluous*. One student even asked the question in the course blog, "Where is my teacher?"

While Knox's (2014) study focused on student perspectives, a dissertation study by Whitesel (2009) focused on the lived experiences of six teachers all of whom had

more than five years of experience in teaching online classes. The participants in Whitesel's research study used terms such as *isolated*, *detached*, and *removed* to describe their attitudes toward their online teaching experiences while admitting they enjoyed the isolation at times. Her participants also asserted on-line teaching was more time consuming than they had anticipated and warned that the distance teaching experience can lead to solipsism. However, they also affirmed the benefits flexibility of teaching from remote locations and additional income affords.

As the emphasis on technology in the classrooms increases, the need for digital literacy increases (Presley & D'Andrea, 2008). Consequently, a lack of digital literacy may result in a student's inability to demonstrate his or her knowledge or skills in the digital environment (Slagter van Tryon, 2013). The lack of digital literacy skills or access to technology is creating another academic performance gap being referred to as the *digital divide* and *excellence gaps* (Hardesty et al., 2014). Jenkins, Clinton, Purushotma, Robinson, and Weigel (n.d.) describe this digital divide as a cultural divide and consider it to be "deeply troubling" (p. 61). In the 2016 National Education Technology Plan entitled *Future Ready Learning: Reimagining the Role of Technology in Education,* the United State Department of Education's Office of Educational Technology also recognized that accessibility is a challenge. Sorden (2013) warns that technology should not drive the instruction but should increase the learner's interest and the limitations of the learner should be considered.

Ricoy, Feliz, and Couto (2013) conducted a qualitative study of university freshmen to explore the digital divide at a university in Spain. In their study, Ricoy et al., asked 91 college freshmen to respond to the survey using a techno-autobiography format

that allowed them to share their experiences and problems using information communication technology (ICTs) in both the academic and personal contexts. The participants revealed that assignments requiring the use of ICTs included creating videos, PowerPoint presentations, blogs, webpages, and spreadsheets. Their study revealed two groups on the same side of the digital divide. The first group consisted of students who were disadvantaged in their access due to economic factors while the other group lacked the digital competence needed to be successful.

Whether or not this new way of delivering instruction and learning is closing or widening the accessibility gap for college students with blindness and visual impairments is the issue that is being explored in this research. Whereas quantitative studies have compared the digital literacy skills of larger populations such as men and women and various ethnic groups (Hargittai, 2010), the small and geographically dispersed population of blind and visually impaired students creates a challenge for quantitative research in this area. Therefore, qualitative research methods are commonly used for studying issues pertaining to this population. Ferrell et al. (2014) suggest more research is needed on the use of assistive technology by blind and visually impaired individuals because, with the exception of a few case studies and some product reports, very little research on the topic exists.

Digital Divide

The increased use of technology has widened the gap between those who use assistive technology and those who do not and has created a new definition of literacy. Those who can successfully access and navigate computers and technology are considered literate and likely to succeed, while those who cannot, will not (Kennard,

2001) thus widening the gap between individuals who have disabilities and those who do not (Cook, 2007). The separation, or gap, between those who are successful technology users and those who are not is sometimes referred to as a *digital divide* (Hardesty et al., 2014).

The digital divide has been blamed on an inequality of access due to factors such as socio-economic gaps and geographical divides (Hoffman, Novak & Schlosser, 2001). Although my search for literature pertaining to the digital divide did not yield any findings that specifically addressed individuals with disabilities, I did find some literature on assistive technology that addresses this gap (Cook & Hussey, 2002; Mankoff et al., 2010; Schmetzke, 2001). Accessibility issues due to disabilities are discussed in greater detail later in this chapter.

The Blind and Visually Impaired Student Population

Due to varying definitions of blindness described in chapter one it is unknown what percentage of the college student population is comprised of individuals who are considered blind. However, according to the United State Department of Education statistics, students with visual impairments, including blindness, account for less than 0.1% of the K-12 student population in the United States (Musgrove & Yudin, 2013). This limited availability of potential participants poses challenges to quantitative data collection yet opens the door to applied qualitative research designs (Mankoff et al., 2010). Hence the limited studies that focus on the blind and visually impaired population as the participants or subjects are often qualitative studies.

It is estimated that approximately half of students with a visual impairment have a co-occurring disability (Batshaw, 2002; Sacks & Silberman, 1998). These disabilities

may include other disabilities such as cognitive, orthopedic, and emotional impairments or even other sensory impairments such as a hearing loss. The impact of an additional disability on a student's ability to access and process information varies widely depending on multiple factors. These factors include the etiology and severity of the eye condition and the etiology and severity of the co-occurring disability.

The presence of a visual impairment with or without a co-occurring disability does not imply a cognitive deficit. Vision loss can be inherited, congenital, or acquired as a result of an illness or injury (Sacks & Silberman, 1998). Two students may have similar degrees of vision loss but the nature and cause of the vision loss and the presence of any additional disabilities result in different needs. What is common amongst those with visual impairments is the limited input of information (Wehman, 2001). Wehman (2001) claims that this limited input of information affects how the visually impaired student makes sense of the world around them. This view aligns with the constructivist philosophy that knowledge and reality are subjective and constructed through personal experience.

Students whose visual impairment is not combined with a cognitive disability should be expected to perform academically at a level commensurate of their sighted peers (Wolffe, 2000). Therefore, the participants selected for this research were not limited to those with no known co-occurring disability but were limited to those individual with no known cognitive disability. I included any knowledge of the presence of any disclosed additional disability as part of the data collection and reporting process. These differences in the characteristics of the participants provide more character and uniqueness to their individual stories.

Technology and Accessibility Issues for the Blind

Concerns regarding equity in the access to and use of technology to assess skills and knowledge of students are nothing new in the educational community or in the field of assistive technology (Mankoff, 2010). While these concerns are applicable to the general population of students, they are of greater concern to individuals with disabilities and even more to the blind student (Mankoff, 2010; Presley & D'Andrea, 2008). In 2000 the Office of Special Education and Rehabilitative Services issued policy guidance through the *Federal Register* that specifically addresses the unique challenges that blind and visually impaired students face in accessing information and the usefulness of assistive technology for these students.

While individuals with visual impairments are benefiting from assistive technologies such as voice recognition software, braille translation software, screen readers and haptic interface technology (Miller et al., 2002), access to technology for the sighted presents additional challenges for blind and visually impaired (Cook & Hussey, 2002; Mankoff, 2010; Presley & D'Andrea, 2008; Shinohara, 2006; Shinohara & Tenenberg, 2007). For example, if a computer application, program, or test requires the use of a mouse to point and click or drag to correctly answer questions (Cook & Hussey, 2002; Miller et al, 2002) or if images other than text are used to convey a message (Shinohara, 2006), blind users do not have equal access to demonstrate their knowledge in the required application, program, or test. If the application, program, or test does not work properly with screen reader software or refreshable braille displays (Kaiser, 2014; Mankoff, 2010) or if the reading of the items negates the test construct, the validity of the results becomes compromised (Allman, 2004).

Although visually impaired individuals use a variety of assistive technologies, screen readers are one of the most commonly used (Lazar et al., 2007). Screen readers are software or accessibility features that read (speak) text on the screen using a speech synthesizer. However, photos, tables, graphs, charts, maps, handwritten material and other non-text materials present unique challenges for individuals who rely on screen readers to access materials as the screen reader does not know how to interpret anything other than text. Additionally, materials presented in columns or divided into sections on the paper or screen create difficulties because the screen readers may not detect the a-typical format and attempt to read the material left to right despite any columns or breaks (Fichten, Asuncion, Barile, Ferraro, & Wolforth, 2009).

In the quantitative study by Lazar et al. (2007), researchers collected data on the frustration levels of 100 blind computer users with their experiences accessing various websites using screen reader technology. Using time diaries, researchers collected data by asking participants to record and rate their frustrating experiences as they occurred using an electronic non-web-based electronic form. The rating scale ranged from 1 (not very frustrating) to 9 (very frustrating). Having the participants record the events as they occur helped increase the validity of the data collected by reducing the loss of memory of details that naturally occurs over time.

Other goals of the study by Lazar et al. (2007) included recording the amount of time lost by the participants during their frustrating experiences and their responses to their experiences in terms of their search for solutions. The results of their study identified the top causes of frustrations as

(a) page layout causing confusing screen reader feedback; (b) conflict between screen reader and application; (c) poorly designed/unlabeled forms; (d) no alt text for pictures; and (e) a three-way tie between misleading links, inaccessible PDFs, and a screen reader crash. (Lazar et al., 2007, p. 256)

Using two different mathematical approaches to calculate time lost due to frustrating experiences, the researchers in the study estimated approximately 30% of the time spent on the computers by the participants was lost or wasted. Of the 308 experiences documented in the study, 110 of the issues were reportedly unresolved while 54 were resolved because the participant claimed to have experienced the issue previously and knew how to solve it. In 39 instances, the participants figured out a way to fix the problem without asking for assistance but asked for help from another person in 32 of the reported situations. Participants described their feelings that resulted from these experiences as *angry at the computer*, *angry with themselves*, and *helpless*. In some instances, however, participants declared a sense of determination to fix the issues. The average frustration score of the 308 reported experiences on the 9-point scale was 6.7, which the researchers felt to be relatively high.

Lazar et al. (2007) compared the results of their study of blind computer users to previous studies of sighted computer users and reported that the blind users responded differently to their frustrating experiences. Blind computer users were more likely to seek a solution and resolve the issue and less likely to give up than sighted users in other studies. Another difference worth noting was blind users in their study were found to have wasted less time responding to issues than sighted users reported in other studies. One possible explanation the researcher offered for this is sighted users in the other

studies were more likely to restart the program or computer rather than trying to resolve the issues which could have saved more time.

As many traditional non-interactive visual technologies (e.g., PowerPoint slides, whiteboards, videos) present accessibility challenges for blind and visually impaired individuals, interactive technologies present additional challenges. An increase in the use of Bluetooth devices, smart phones, iPods, iPads, web-cams and video-conferencing are impacting the way instructors are interacting with their students and delivering instruction (Agbatogun, 2013; Whitsel 2009). So while technology may be exciting and can make our lives better, it can also be intimidating if it is not used within an appropriate context (Thomas, 2011).

Another technological challenge that has impacted the braille user community has been the difficulty of translation between braille and print. The braille code was originally designed for paper-based usage. As technology has grown, the need for braille translation software has evolved (Cook & Hussey, 2002). But as technology has become more complex, the ability to translate from print to braille (forward translation) and braille to print (backward translation) has become increasingly difficult. In an effort to address the translation and technology issues the Braille Authority of North American (BANA) adopted the Unified English Braille (UEB) code to replace the traditional braille code known as English Braille American Edition (EBAE). The UEB braille code, while similar to EBAE, allows for the usage of new symbols not previously recognized in EBAE and easier translation both forwards and backwards. Examples of text that were previously difficult to translate would be usernames, passwords, and email addresses where strings of letters, numbers, and symbols exists.

According to Ricoy et al. (2013), institutions should strive to eliminate inequalities in terms of access to technology by providing or loaning equipment to students, allowing for additional class time for Internet access, or providing alternate assignments.   However, the applicability for this recommendation as it would apply to assistive technology that is designed specifically for braille users may not be practical or feasible as braille-related technology is costly (Cook & Hussey, 2002; Lazar et al., 2007; Nemeth, 1998). Therefore, institutions and individuals are continually faced with the determination of who bears the responsibility of such cost associated with ensuring access to materials.

There are numerous accessibility and accommodation options that must be considered in making appropriate recommendations regarding accommodations. Options for braille users may include paper braille, refreshable braille, interpoint (2-sided braille), contracted and uncontracted braille. Options for auditory learners may include screen reader software or live (human) readers. Presenting materials tactually or through auditory means is not the equivalent to presenting it visually and can be confusing to the blind user (Shinohara, 2006). Two-dimensional graphics that imply three-dimensional concepts do not mean the same thing to a visually impaired child as they do to a sighted child (Morse, 2001).

Numerous factors should be considered when selecting assistive technologies for individuals with visual impairments. Lueck, Dote-Kwan, Senge and Clarke (2001) identify factors for consideration when selected assistive technologies. Personal preferences, cognitive abilities, physical and visual abilities and motivation of the individual, availability of the technology and cost are among the factors that should be

considered. Despite the accessibility issues they encounter, blind and visually impaired students should not be denied the right to learn skills just because they are difficult (Allman, 2004) or because accessibility is costly (ADA).

Because the needs of individuals with visual impairments are so unique and the disability is a low-incidence disability, despite their best efforts to make technology accessible by everyone, many website, hardware, and software technology developers have little knowledge of accessibility (Mankoff, 2010; Power et al., 2012).   Schmetzke (2001) likens the issue of individuals with disabilities that have difficulty accessing print materials as being an invisible issue in the online environment. Schmetzke uses the example of being able to see someone in a wheelchair struggle to navigate their way around physical obstacles but not being able to see someone struggle to navigate their way through an online environment. The difference in the two scenarios is that when people see the struggles of others they become aware of them and acknowledge the need for change. But when the struggles go unnoticed they are not acknowledged or addressed.

Schmetzke's 2001 study collected data on the accessibility of distance education websites. Using an electronic tool designed for testing website accessibility and compliance with Web Content Accessibility Guidelines and Techniques (WCAG) standards, Schmetzke tested the home pages of 219 distance education websites and discovered only 15.1% to lack major accessibility errors. Drilling deeper into linked websites, he found only 23.3% of 3,366 web pages to be accessible. Schmetzke encourages institutions of higher education to be pro-active by ensuring that online education programs are accessible to individuals with disabilities. He further states that if

institutions continue to ignore the issue they are contributing to the digital divide by excluding this population.

Nearly ten years after Schmetzke's 2001 study was published, researchers Power et al. (2012) published the results of a study that describes the problems 32 blind computers users encountered on pre-determined websites using screen readers. In their study, the researcher gave the participants tasks to perform on specific websites and asked the participants to rate the severity of any problems they encountered using a four-point scale. The scales corresponded with four levels of severity: cosmetic, minor, major, and catastrophic. Unlike the Schmetzke study that focused on distance education websites, their study included a variety of websites including retail, government and non-profit organizations among others. Their research identified an astounding 1,383 problems on only 16 websites. They believe their results may indicate that website developers are still not implementing strategies to reduce accessibility barriers for individuals with disabilities. They further claim that the accessibility issues with websites are worsening not improving despite legislation and increased awareness.

Not only do the developers of such technology lack the knowledge and understanding of the needs of this small population, so do many of the teachers who work with them. A study by Leyser and Heinze (2001) reported that parents of blind children have expressed concern about the lack of skills or experience among general education teachers in dealing with visually impaired students. The participants in this study also indicated that teachers do not know how to make adaptations and/or are not willing to do so. While studies like this indicate the lack of skills professional in the K-12 setting, post-secondary institutions also struggle to meet the unique needs of this population.

In the study by Alvez et al. (2009), 94.8% of the teachers in their study indicated that they did not use information technology with their visually impaired students citing multiple reasons including they did not know how to use the technology, the students did not know how to use the technology, or they believed the visual impairment prevented the student from using the technology.

Related Studies

Shinohara and Tenenberg (2007) conducted an in-depth exploration for a descriptive case study of a female college student who was blind. Although Shinohara and Tenenberg describe the participant as being a college student their focus was not on the participant's experiences as a college student but rather as an individual who uses assistive technology in her daily life. The study included observations in her home using multiple devices including her watch, kitchen tools, cell phone, electronic dictionary, braille note-taker, screen reader software on her computer, and refreshable braille displays. In addition to the observations, the researchers collected data through interviews. During the interviews Shinohara and Tenenberg asked the participant to recall memories and describe her attitudes and feelings toward her memories. They recorded and transcribed the interviews then combined the recordings with other data collected such as photographs and observational notes.

Two other studies, both described in the same report by Fichten et al. (2009), explored accessibility issues of visually impaired college students in Canadian universities. In their first study, the researchers administered an online questionnaire to 139 participants. The researcher separated the participants into two categories: those who were totally blind and those with low vision, and asked both groups to rate, using a 6-

point Likert scale, how well their technology needs were met across a variety of contexts both on campus and at home. The study also captured the types of assistive technology used by the participants.

The results for both groups in this quantitative study revealed a significant difference in how well they felt their needs were met at home versus on campus with the home having the more favorable results. The results also indicated for both groups that the technology used by the participants at home was significantly more up to date than the technology available to them on campus. Blind participants expressed less satisfaction than the participants with low vision on 15 of 17 questions with the biggest discrepancies in the areas of distance education, the instructor use of e-learning materials, and when asking for informal help from the institution's staff regarding technologies at school.

In the second study described by Fichten et al. (2009), researchers used a convenience sample to select 33 participants. Participants were all Canadian college students who identified themselves as either totally blind or as visually impaired. Using open-ended questions, researchers asked participants to identify three problems they had encountered with e-learning materials as well as how the problems were resolved. Both groups indicated they felt that email, course web pages, online discussion forums, and Word documents were generally accessible. However, both groups cited difficulties with video conferencing, online quizzes, some Portable Document Format (PDF) documents, and materials on CD-ROM or that required a Flash player for access. Participants who were blind also cited accessibility issues with PowerPoints and other materials projected during class along with time limits imposed during online exams. Approximately half of

the participants in this study indicated that at least one of their three problems was never resolved. Solutions cited included obtaining materials in alternate formats, devoting more time and effort to the tasks, and seeking assistance from others.

Assistance from others included friends, classmates, professors, or e-learning specialists. The researchers referred to some solutions, including assistance from others, as *non-e-learning solutions*. These solutions included having another individual read the materials.

As these two studies merged into one report, Fichten et al. combined the discussions and implications of the two studies in one report. In their report, the researchers noted that most of the participants across both groups indicated they use multiple technologies to access the various required materials and nearly all of them used screen reader software. However, none of the 18 types of e-learning evaluated were deemed to be completely accessible by blind group. Problems with PDFs stemmed from the origin of the PDFs. If the file was a scanned image or contained annotations such as handwriting, underlining or margin notes, screen readers have difficult correctly interpreting the document.

Implications of the two studies include the need for students to be proactive in their educational experience and universities to be proactive in their assessment of campus technologies and training of staff on accessibility issues. Fichten et al. (2009) confirm the need for additional research to compare the experiences of students with visual impairments with those without visual impairments with e-learning materials. They do assert that their research has value in that it gave the participants an avenue to express their opinions and allow their voices to be heard.

Howard (1994) conducted a qualitative study of adult first-time computer users. The study revealed when instruction becomes technology-centered rather than learner-centered, computer users may experience confusion, frustration or even humiliation. In light of this, Howard acknowledges that quantitative data regarding the presence and usage of computers is abundant, but qualitative studies that further explore the personal experiences of the users is still emerging.

Shinohara and Tenenberg (2007) used Yin's (2003) qualitative research principals. Their study, along with the two studies conducted by Fichten et al. (2009), laid the foundation for this research in terms of the goal of the research. The major differences in methodology will be described in chapter three of this dissertation research.

This study will expand the body of qualitative research literature on the topic of visually impaired college students in digital classroom by capturing the personal experiences of college students who rely on assistive technology to access information due to the absence or limitations of their visual sense. As the researcher, I tried to capture their successes as well as their failures, their problems as well as their solutions, their hopes, fears, frustrations, and advice. These are what Mankoff et al. (2010) refer to as the "soul of the experience" (page 7).

Qualitative Research and Case Study Designs

Research begins with curiosity and inquiry. Qualitative research is a form of inquiry that allows researchers to explore and understand individuals or groups of individuals, their experiences, and their perceived reality of their experiences (Berg, 2007; Creswell, 2014; Merriam, 2009). Unlike quantitative research, qualitative research

is used to explore and describe rather than test hypotheses or control behaviors (Creswell, 2013; Merrriam, 1998; Yin, 2011). It is not intended to predict behaviors or make any generalizations to a larger population (Merriam, 2009). Qualitative researcher findings are typically reported in words, rather than numbers (Corbin & Strauss, 2008; Creswell, 2014).

Validity and reliability in qualitative research have been topics of concern and debate among researchers (Herbert & Beardsley, 2002; Merriam, 2009; Yin 2011). These concerns stem primarily from the flexibility in the data collection process associated with qualitative research on human subjects (Creswell, 2014; Jones, 2002). However, good qualitative research requires a mixture of flexibility and structure. Guidelines allow the researcher the flexibility needed for the nature of qualitative inquiry while also providing the structure needed for validity and reliability of research on human subjects (Creswell, 2014; Jones, 2002; Merriam, 2002; Taylor & Bogdan, 1984).

Qualitative researchers can also enhance reliability and validity to their studies by employing strategies such as triangulation, member checking, and peer debriefing (Creswell, 2014; Merriam, 2002; Moustakas, 1994). Member checking is a process of allowing participants to review the results. This external check of the data helps to ensure accuracy and strengthen the validity of qualitative studies (Creswell, 2013; Rubin & Rubin, 2012).

Interviews

Interviews are one of the most popular forms of data collection in qualitative research (Johnson & Christensen, 2012; Strauss & Corbin, 1990). In-depth interviews are used in qualitative research to capture experiences, attitudes, beliefs, and opinions of

the participants. This method of data collection helps the researcher to capture, understand, and communicate the perspectives of the participants (Rubin & Rubin, 2012; Schumacher & McMillan, 1993). Compiling narrative descriptions from intensive interviews allows the researcher to create a portrait that depicts the experiences and perspectives of the participants being studied (Creswell, 2013; Merriam, 1998; Rubin & Rubin, 2012; Schumacher & McMillan, 1993; Yin, 2011).

Interview guides are used to help guide the researcher through the interview process by providing probing questions (Berg, 2008). Rubin and Rubin (2012) advise researchers to probe according to how comfortable the participants appear to be during the interview. Interview guides provide flexibility to keep the interviews in conversational format while ensuring that the level of detail needed is obtained for data collection (Merriam, 2009; Rubin & Rubin, 2012; Schumacher & McMillan, 1993; Taylor & Bogdan, 1984). Guides also provide some level of consistency in the questions across multiple participants thus strengthening the reliability of the data collection process (Merriam, 1998).

Qualitative researchers are encouraged to record and transcribe interviews as part of the constant comparative data analysis process (Johnson & Christensen, 2012; Kolb, 2012). Participants should be advised of and consent to the recording. Additionally, as part of the member-checking process, participants should be allowed to review the transcriptions for accuracy (Rubin & Rubin, 2012).

Document Reviews, Field Notes, and Memos

Other forms of data collection in qualitative research consist of document reviews, field notes and memos. Document reviews are reviews of documents including

electronic documents. Field notes are notes that are taken by the researcher before, during, or after observations and interviews. They may consist of thoughts, reflections, ideas, questions, or inspirations that come to mind (Corbin & Strauss, 2008; Merriam, 2009; Schram, 2003). While field notes and memos are unstructured, they are information and can be valuable to the data analysis process (Bogdan & Biklen, 2007).

Constant Comparative Data Analysis

In qualitative research, data analysis primarily coincides with the data collection process through an ongoing, constant comparative analysis (Creswell, 2014; Johnson & Christensen, 2012; Kolb, 2012; Merriam, 2009; Schram, 2003). This method allows for a continuous comparison and analysis of the data during the data collection phase. The constant comparative data analysis method also allows for the identification of any recurring themes or patterns and cross-case similarities (Baxter & Jack, 2008; Bernard, 2000; Creswell, 2014). This method of data analysis also enhances the validity and reliability of the research findings by allowing the researcher to identify and question any conflicting messages during and after interviews and throughout the data collection process (Herbert & Beardsley, 2002; Merriam, 2002).

Triangulation of Data

Triangulation occurs when multiple perspectives and data sources are used in the research (Joyner et al., 2013). Using triangulation increases the depths of the investigations, reveals multiple realities (Berg, 2007), and strengthens the reliability and validity of evidence (Creswell, 2013; Merriam, 1998). Triangulation helps qualitative researcher to corroborate evidence and to gain deeper and broader perspectives of the issues (Taylor & Bogdan, 1984).

Case Study Designs

When determining what type of qualitative research design to use, Yin (2003) recommends that the researcher consider the following three conditions:

(a) the type of research question(s) posed, (b) the extent of control an investigator has over actual behavior events, and (c) the degree of focus on contemporary as opposed to historical events. (p. 5)

Based on Yin's criteria, "how" and "why" questions concerning behavioral events that focus on contemporary events of which the researcher has no control will likely lead to the use of case studies as the preferred research strategy.

Case studies allow the researcher to collect data through multiple avenues such as reviews of documents, interviews, and observations. Yin (2003) clarifies that direct, detailed observations are not a requirement of case study research. Furthermore, Yin is of the opinion that there are no broad distinctions between single and multiple case study designs. However, the multiple case study design has both advantages and disadvantages to the single case study design.

The more obvious disadvantages of conducting research using the multiple case study design is that more resources and time are required compared to the single case study design (Yin, 2003). They can also create an unmanageable amount of data (Bogdan & Biklen, 2007; Merriam, 2009). When determining what cases to include in a multiple case study, each case should be carefully selected so that replication of the data collection can occur. This replication helps provide credibility and validity to the study thus creating an advantage over the single case study design (Merriam, 2009; Yin, 2003).

Multiple case studies have other advantages. Multiple case studies may be less

extensive that single case studies. They may be used to compare and contrast single case studies or for generalizability (Baxter & Jack, 2008; Berg, 2007; Bogdan & Biklen, 2007; Merriam, 1998). Creswell (2013) recommends four or five cases for a multiple case study. The choice between single or multiple case designs or how many cases to include is ultimately that of the researcher.

Theoretical Framework

As a sighted person I am able to observe the actions of a blind person and their interactions with their environment. However, because I am not blind I cannot truly know how a blind person feels or understand what they have experienced because I am not blind. The idea that I can only know what I have experienced personally and how I interpret that experience forms my reality of the experience are philosophical assumptions rooted in the constructivist ideology of philosophers Edmund Husserl and Alfred Schutz (Merriam, 2009).

Constructivists believe that knowledge is born out of experience (Brooks, 2013; Gall et al., 2007; Narayan et al., 2013) and a search for understanding (Brooks, 2013); therefore, it is subjective (Baxter & Jack, 2008; Creswell, 2014). One cannot transfer knowledge to another; rather they can integrate new information through discovery or experiences with preexisting knowledge and experiences (Narayan et al., 2013; Sharpiro & Permuth, 2013). Constructivists claim that truth and reality are not absolute, rather they are relative only to the individual that has constructed it (Gall et al., 2007; Merriam, 2009; Rubin & Rubin, 2012). Because knowledge and reality are relative to the individual with whom it resides the possibility of multiple versions of reality or the metamorphosis of reality exists (Corbin & Strauss, 2008; Gall et al., 2007; Rubin &

Rubin, 2012; Schram, 2003; Yin, 2011).   Consequently, individual views and perceptions of reality develop as a result of their unique and personal experiences (Corbin & Strauss, 2008; Shapiro & Permuth, 2013).

One of the goals of qualitative research is to understand human behavior and what the lives and experiences of others are like through their perspectives of reality (Bogdan & Biklen, 2007; Schram, 2003). Literature in qualitative inquiry provides an ethical process for researchers to explore the personal experiences of others, collect, interpret, and analyze data, and report the findings through narrative descriptions (Merriam, 2009; Roberts, 2010; Rubin & Rubin, 2012, Schram, 2003; Yin, 2011).

Qualitative research requires a mixture of flexibility and structure. Guidelines allow the researcher the flexibility needed for the nature of qualitative inquiry while also providing the structure needed for validity and reliability of research on human subjects (Creswell, 2014; Jones, 2002; Merriam, 2002; Taylor & Bogdan, 1984). The simultaneous collection and analysis of data in qualitative research allows for themes to emerge during the data collection process rather than identifying or selecting themes in advance (Johnson & Christensen, 2012; Rubin & Rubin, 2012; Schram, 2003). The constructivist approach incorporates the perspectives and feelings of their participants into the findings as these factors give breadth and depth to the data (Schumacher & McMillan, 1993) and arise during the ongoing constant comparative analysis of the data (Schram, 2003). The constructivist approach also emphasizes the beliefs and perceptions of the participants rather than the research methodology (Creswell, 2013). Because of the intent to incorporate the subjective perspectives of individuals the constructivist viewpoint serves as the theoretical framework for this dissertation research study.

The structure employed in this research study included an interview guide containing questions that could be used if needed, tape recordings of the interviews, and member-checking by the participants (Bernard, 2000; Merriam, 2002, 2009; Rubin & Rubin, 2012; Schumacher & McMillan, 1993; Taylor & Bogdan, 1984). I instituted a degree of flexibility during the interviews as the stories unfolded as told by the participants (Schumacher & McMillan, 1993).

Summary

Technology designed to assist blind and visually impaired individuals provides access to the ever-evolving digital world in which we live. But whether or not that access is equal may vary from user to user or even situation to situation (Mankoff et al., 2010) and the digital college classroom is no exception. Some researchers (Power et al., 2012) believe that although awareness of the need for universal access has increased over the last decade, and technology that allows for greater access is more readily available, obstacles may be increasing as website developers are still not ensuring access, possibly due to lack of knowledge on the subject.

College students who rely on assistive technology to access information because of a visual impairment are facing challenges as the focus on the use of technology in education increases (Presley & D'Andrea, 2008). This chapter described studies of computer users who used screen readers to access online information. Some of these studies were specific to educational contexts, while others were not.

How individuals respond to and perceive the challenges associated with access to digital materials differ from one person to another as each individual's experiences are unique. The goal of this research was to capture the experiences and perceptions of those

experiences.   This research will also serve as a voice for the participants by raising awareness of the issue and potentially revealing a need for changes in policies and practices that may improve the lives of an otherwise marginalized population (Creswell, 2014; Mankoff et al., 2010; Power et al., 2012).

CHAPTER III. METHODOLOGY

The purpose of this investigation was to illuminate the unique experiences of blind or visually impaired college students with their access to digital college course materials. This chapter is a detailed description of the research methodology utilized in the dissertation study. Using a multiple-case study design, this research is intended to capture the experiences of individuals through reliable and robust accounts of the participants (Merriam, 1998). The study hopefully will enlighten post-secondary staff, present and future college students, and those who support them (i.e., teachers of the visually impaired, vocational rehabilitation counselors, and family members) so that obstacles may be removed to enhance the chances of successful completion of their post-secondary education.

Research Questions

Two questions guided this dissertation research: (1) How are the experiences with digital college classrooms perceived by visually impaired college students? (2) What obstacles do these college students face in accessing, completing, and submitting required assignments and how do they respond to those obstacles? While these research questions served as the driving force for the initial interviews, I used additional questions to probe or clarify (Berg, 2007; Rubin & Rubin, 2012).

Roles and Responsibilities of the Researcher

In this research, I served as the primary data collector. I used intensive personal interviews (Rubin & Rubin, 2012) along with reviews of documents and field notes (Corbin & Strauss, 2008) as the instruments for data collection and analysis. I considered the participants to be my co-researchers. Participants in qualitative research are often

referred to as co-researchers because of the interactive role they play in the lengthy narrative interview process and their contribution to the triangulation process for validation before publication (Moustakas, 1994; Rubin & Rubin, 2012; Yin, 2011). As the primary researcher for this study, I was bound to uphold ethical standards associated with conducting meaningful research with human participants (Creswell, 2014; Gall et al., 2007; Moustakas, 1994; Rubin & Rubin, 2012; Yin, 2011). As a qualitative researcher, I needed to be aware of any influence my background and perspectives may have had on my research and the need to be willing to set aside or even change those perspectives (Bogdan & Biklen, 2007; Merriam, 1998; Moustakas, 1994). Although I intended to reduce any personal biases and strengthen the validity and reliability during the data collection, analysis, and reporting phases (Creswell, 2014) of the research by bracketing my personal thoughts, ideas, perspectives, or preconceived opinions, I admit I had a minimal amount of preconceived notions resulting in some surprise at the findings. As the researcher, I ensured participants were not coerced unethically to participate (Roberts 2010) nor influenced in such a way as to force responses or illicit insincere or untruthful responses (Gall et al., 2007).

As part of the research approval process described by Joyner, Rouse, and Glattorn (2013) and Roberts (2010), I obtained Institutional Review Board (IRB) approval before contacting participants. Based on the minimal risk to the participants involved (Roberts, 2010), the IRB performed an expedited review. Once I obtained IRB approval and identified potential participants, I provided the potential participants with informed consent (Joyner et al., 2013; Roberts, 2010; Rubin & Rubin, 2012; Schram, 2003) and explanations of the informed consent during the recruitment and selection process. I put

processes such as those described by Moustakas (1994) and Rubin and Rubin (2010) in place to insure confidentiality of the participants who wished to not be identified. These processes are explained in further detail later in this chapter and were explained to the participant during the recruitment and selection process as well as at the beginning of the interviews. I conducted interviews in locations selected by the participants to help maintain the level of confidentiality they requested.

Rationale for Using Qualitative Research

The intent of this research study was to describe and explain complex situations and experiences of individuals. More specifically, the intent was to capture the experiences of individual college students who are blind or visually impaired through narrative descriptions of their personal lived experiences as they remembered and articulated them. Based on the information obtained through the pertinent literature reviewed and described in chapter two, I chose to use a qualitative multiple case study research design for the study. Because the intent was to explore and describe the unique experiences of individuals rather than to quantify their experiences, to test hypothesis, or to control behaviors, I used qualitative multiple-case study research methodology to capture and analyze the data associated with this dissertation research project (Creswell, 2013; Merriam, 1998; Yin, 2011).

Research that focuses on understanding the perspectives of the participants through rich narrative descriptions is consistent with qualitative research methods (Creswell, 2014; Rubin & Rubin, 2012). Through in-depth interviews, I explored the experiences, attitudes, beliefs, and opinions of the participants in an effort to help understand and accurately communicate their perspectives (Rubin & Rubin, 2012;

Schumacher & McMillan, 1993). The choice to include multiple participants allowed for the analysis of data within and across participants and settings (Baxter & Jack, 2008; Merriam, 1998). My goal, as the researcher, was to create a portrait that accurately depicted their unique experiences and perspectives (Creswell, 2013; Merriam, 1998; Rubin & Rubin, 2012; Schumacher & McMillan, 1993; Yin, 2011) by compiling narrative descriptions from multiple participants while simultaneously comparing and contrasting their experiences. Consistent with qualitative research, this research study was not intended to explain or analyze any phenomena (Moustakas, 1994), predict any particular behaviors, test hypotheses, or make any generalizations to any larger population (Merriam, 2009). Rather, the intent of this dissertation research was to gain knowledge of meanings from the lived experiences of the participants (Creswell, 2014) from their perspectives (Roberts, 2010).

Sampling Procedures

I purposefully selected participants using a combination of criteria and convenience (Creswell, 2014; Merriam, 2009; Schumacher & McMillan, 1993). Since blindness is a low-incidence disability, the pool of possible subjects was small (Musgrove & Yudin, 2013). Using my access to a network of professionals who work with individuals who are blind, I solicited and selected volunteer participants. I also used snowball sampling (Merriam, 2009; Schumacher & McMillan, 1993) to increase the pool. The pool included former students of the school where I previously worked, former students of other teachers in the field of visual impairment, colleagues, and friends of other participants. This method yielded seven potential participants of whom only five responded indicating an interest in participation.

In order to qualify to participate, the potential participants were required either to be currently enrolled in a college or university or to have been enrolled in the past year. No specific college or university was selected for this study. Enrollment in any public or private community college or four-year institution qualified for participation. Participants selected could not have any known cognitive disability but may have had other co-occurring disabilities. I selected a targeted sample size of four participants based on the literature regarding multiple case study qualitative research design (Creswell, 2014) combined with the small population size of the target population and the need for convenience due to limited resources (Johnson & Christensen, 2012). Consistent with qualitative multiple case study design (Merriam, 2009) sampling was not intended to be representative of the entire blind and visually impaired population; therefore, I did not place any restrictions on age, race, gender, college academic standing, or years enrolled in college for participation.

Once I identified potential participants, I made contact with them via telephone to describe the purpose of the study and determine their interest in participation. After they indicated an interest in participation, I sent emails explaining the purpose of the study along with an informed consent form for their review. Upon their indication of their willingness to participate, we mutually determined a time and location for the initial interview based on their convenience. At the beginning of the personal interview, I obtained a signed release of informed consent (Joyner et al., 2013; Roberts, 2010; Rubin & Rubin, 2012; Schram, 2003). I informed participants, both verbally and through the informed consent form, their consent was voluntary and they could withdraw from the

research study at any time (Gall et al., 2007; Schram, 2003). I provided braille versions of the informed consent letters to the participants who requested such.

<div align="center">**Data Collection**</div>

The validity of the data collected during research, including qualitative research, can and should be strengthened by including multiple data sources (Yin, 2011). Case study research is no exception (Baxter & Jack, 2008). One of the most popular forms of data collection in qualitative research is interviews (Johnson & Christensen, 2012; Strauss & Corbin, 1990).

Interviews

Using semi-structured interviews (Berg, 2007; Bernard, 2000; Merriam, 2009) with each of the four participants separately, I used a narrative inquiry process to elicit in-depth responses from the participants. I encouraged participants to describe their personal experiences (Moustakas, 1994; Roberts, 2010; Schumacher & McMillan, 1993) involving accessing digital materials as part of their college experience as well as their opinions and feelings about these experiences.

Using the two foundational questions of the research to initiate the conversation, I conducted the interviews in a conversational format (Taylor & Bogdan, 1984). I used additional questions to help guide the interview when participants needed additional probing for clarity or a deeper understanding (Berg, 2008). This flexibility helped keep the interviews in a conversational format while ensuring I obtained the level of detail needed for data collection (Merriam, 2009; Rubin & Rubin, 2012; Schumacher & McMillan, 1993; Taylor & Bogdan, 1984). The interview guide also provided some consistency in the questions across the multiple participants thus strengthening the

reliability of the data collection process (Merriam, 1998). Appendix A includes the interview guide that outlines the two major questions and probing questions. I vetted these questions through the dissertation committee and submitted the questions to the IRB as part of the approval process.

During the interviews I encouraged participants to explain what technologies they use as well as how and where they use them. For example, I encouraged participants to share whether or not they used the school's facilities and equipment (i.e., library services, computers, tutoring labs). In addition to the guiding questions, I encouraged participants to share their experiences in terms of the cooperation and responsiveness of the institution's staff members (professors and/or support staff). All four participants appeared to be comfortable sharing their stories with me. Based on my research, I chose whether or not to use the probing questions according to how comfortable the participants appeared to be with me and how much they were sharing during the interviews (Merriam, 1998; Moustakas, 1994; Rubin & Rubin, 2012).

I conducted all initial interviews in person at locations selected by the participants. I interviewed two of the participants on their respective college campus. One participant asked to be interviewed in a public location and selected a local fast-food restaurant as the location for the interview. I privately conducted the fourth participant's interview in a conference room in an undisclosed location in order to maintain confidentiality and anonymity.

I recorded the in-person interviews using a hand-held recorder and later transcribed the recordings as part of the ongoing (constant comparative) data analysis (Johnson & Christensen, 2012; Kolb, 2012) process. As part of the member-checking

process, I emailed transcriptions of the interviews to the participants. In order to reach data saturation (Merriam, 2009; Rubin & Rubin, 2012), I asked follow-up questions through phone calls and emails with some of the participants on an as needed basis.

Over the course of approximately six months following the initial interviews I made two additional calls to Alex and one to Claire for clarification and follow-up. Although I did not record the calls, I took notes during the calls. In addition to the phone calls, I exchanged a total of eight emails with both Alex and Claire, four with Denise, and two with Brad. I also used text messages in my attempts to remind participants of the need for them to verify the accuracy of the transcripts and drafts.

The interviews ranged in length from 29 minutes to 38 minutes. This does not include the interview with Denise. I did not transcribed Denise's interview entirely because the recorder's batteries died during the interview. Denise's interview was the longest of the four interviews but the exact time frame is unknown. The average time of the interview portion of the data collection including introductions, explanation and signing of the informed consent, closing remarks, and distribution of gift cards was approximately 50 minutes to an hour.

Document Reviews

During the interviews I asked participants to share any documents such as course syllabi, correspondence they may have with professors or ADA coordinators, or assignments they may have submitted. This was part of the triangulation process. As a result, three of the four participants provided copies of course syllabi and documentation of requests for accommodations. One participant provided copies of an actual graded quiz.

In addition to interviews, I reviewed documents such as the discrimination policies, disability services available, mission statements, and philosophies of the colleges and universities of the selected participants as part of the data collection process. As previously noted, the intent of this research was not to measure the school's compliance or level of support services that they offer to their visually impaired students.

Field Notes and Memos

During the interviews I took observational notes as well as notes regarding any thoughts, reflections, ideas, or inspirations that came to mind (Corbin & Strauss, 2008, Merriam, 2009; Schram, 2003). I used memos for insight and reflection, as well as a source of data (Bogdan & Biklen, 2007; Merriam, 1998). I took additional notes during the interview transcription process as thoughts and questions arose. This note-taking was also part of the constant comparative data analysis process.

<div align="center">

Data Analysis

</div>

In keeping with the constant comparative data analysis procedures in case study qualitative research, I attempted to identify any recurring themes or patterns and cross-case similarities that surfaced as I interviewed different participants, reviewed documents, made notes, and coded data (Baxter & Jack, 2008; Bernard, 2000; Creswell, 2014;). As I transcribed the participant interviews, I coded statements (Bernard, 2000; Moustakas, 1994) as I identified them as possible themes. Qualitative researchers add reliability and validity to their studies by employing strategies such as triangulation, member checking, and peer debriefing (Creswell, 2014; Merriam, 2002; Moustakas, 1994). Therefore, I employed these methods as part of the data collection and data review processes.

Member Checking and Peer Debriefing

After I transcribed the interviews, I provided participants with electronic copies of the transcription. I asked participants to review the transcription for accuracy and respond if they had any additional comments they wanted to add or if anything needed to be clarified or corrected. The process of allowing the participants to review the results (Rubin & Rubin, 2012) helped to ensure I accurately captured what they attempted to communicate while providing an external check (Creswell, 2013) of the process. Three of the four participants confirmed they had read the transcription and had validated the accuracy. I made five attempts via emails, text messages, and voicemail to the other participant requesting confirmation of the transcript's accuracy but never received any written confirmation. I also checked for accuracy (Creswell, 2014) by attempting to identify and question any conflicting messages during or after interviews as part of the constant comparative data analysis process to enhance the validity and reliability of the research findings (Herbert & Beardsley, 2002; Merriam, 2002). As a final check, I provided all four participants with a draft of the results that included the findings of all participants for their review and feedback. The same three participants who responded to my request to check the transcriptions for accuracy responded with their approval of the draft of the results and findings.

Triangulation

Three of the four participants provided documents such as course syllabi and correspondence with university faculty and staff regarding their accommodation needs. I reviewed the documents and correspondence provided by the participants as well as mission statements, policies, procedures, and philosophies of institutions to corroborate

evidence as well as to gain deeper and broader perspectives (Taylor & Bogdan, 1984) of the issues.

Summary

Chapter three provides a summary of the methodology used in this qualitative multiple case study research project. The primary instrument for data collection was open-ended interviews structured to capture the lived experiences of visually impaired college students in digital college classrooms. The interviews were intended to provide a robust narrative account of their successes and failures in the digital college classroom. In addition to interviews, I reviewed documents such as college and university mission statements, philosophies, policies, class syllabi, student-faculty correspondence, and student assignments of some of the participants. My secondary goal for this research was to provide a communication tool that would allow the participants a mechanism for having their voices heard and bringing the core of their challenges to light. Chapter four describes the participants and their interviews and provides cross-case comparisons and themes identified during the data collection process.

CHAPTER IV. RESULTS

The purpose of this chapter is to introduce the reader to the participants and

present a summary of the findings of the data collected and how the data were analyzed.

This chapter describes the participants and their interviews and themes identified during

the data collection process. How the findings compare and contrast to the studies

discussed in chapter two and how they compare and contrast to each other are presented

in chapter five.

I selected four participants for interviews, two males and two females. In order to

help protect their identities, pseudonyms (Alex, Brad, Claire, and Denise) are used in lieu

of their real names. Additionally, their exact ages, and the names of the institutions they

attended are not disclosed. Worth noting is that Alex, Brad, and Claire all attended the

same state university in their pursuit for their undergraduate degree and Denise attended

the same university before transferring to her current university.   This fact was unknown

at the time of recruitment and was discovered during the interviews. Table 1 provides a

snapshot demographic profile of the participants.

Table 1

Participant Profile

Participant	Gender	Ethnicity	Age Range	College Standing
Alex	Male	African American	40s	Graduate Student
Brad	Male	Caucasian	20's	Undergraduate Student
Claire	Female	African American	30's	Graduate Student
Denise	Female	African American	20's	Undergraduate Student

This chapter describes the participants and their interviews in the order in which they were conducted. Appendices D-G contain the transcribed interviews with Alex, Brad, Claire, and Denise, respectively. Included in this chapter are the themes that I identified as I collected data. Common themes included the reliance on the support of others, the lack of education and training of institutional faculty and staff, and the importance of self-advocacy and self-motivation. Cross-case comparisons are discussed in more detail in chapter five.

Comparisons include use of screen readers, use of personal equipment versus provided equipment, and accessibility to textbooks and other materials. As part of the interview, I asked participants to reflect on their experiences, to offer advice for others including university presidents, and to share their concerns for the future. Their answers to those questions are included in this chapter.

Alex

Alex was an African-American male in his mid-forties who described himself as being legally blind without his glasses and "teetering on the edge" with his glasses. At the time of Alex's interview, he was working on a specialist degree at a small faith-based university. Appendix D contains the transcribed interview with Alex.

Alex received his bachelor's degree from one of the state's major universities and his master's degree from another small faith-based university. He indicated he had been visually impaired since birth and has worn glasses since he was a toddler. He felt his visual condition was relatively stable during his undergraduate college years but believed it has gotten progressively worse over the past few years. He attributed this as possibly being linked to the amount of time he spendt on the computer as part of his job.

Alex stated he used a Mac with a 27 inch screen for personal use:

Its about a 27 inch Mac and I am able to blow documents up as large as I need them, magnify them as large as I need them to read them. But sometimes at the end of the day after working all day and looking at the computer and your phone reading can be harder at night for me. And so it is easier for me to have the PDF read to me; and if a document is converted to a PDF rather than scanned, you can read it. The computer will read it to you but if it is a scanned picture, that is a challenge.

Alex did not know braille and further explained how he sometimes had to listen to a text passage multiple times before comprehending it. He attributed this to having to make the switch from visual, his primary learning mode, to auditory. He further claimed he knew it was not the university's fault he had to work all day reading before going home visually fatigued only to have to then work on what he described as his "second shift" of school work.

Alex shared about his experiences at all three universities regarding his access to the digital classroom. He first shared his experience at the small faith-based university where he received his master's degree. He described his experience there as "good, because they were mindful of PDFs." He explained how the program he was in assigned him to an individual who assisted him throughout the entire program in helping him register for courses and get his books in PDF format.

Alex explained how the institution had been allowing him extra time for both quizzes and assignments:

So, rarely did I need the time and a half to complete the assignments unless it was

a paper where we had to you know use 15 sources or 12 sources or something like

that, and then of course the reading was more and I would need to take advantage

of the time and a half. But typically, those were end-of-course assignments.

Alex did indicate how although the institution's staff were helpful, one professor

was not as accommodating to his need for additional time:

And so with one instructor, he shared with me that I knew about this assignment

from the beginning of the course so I should have been working on it all along.

But, I don't think he understood the challenge it is for me to do the weekly work.

And so we ended up into…. When I finished my assignment about a week later

and he would not accept it and was going to assign me an "F" for the course. And

um, I went and talked to the ADA advisor and they worked through it and actually

he had to grade the assignment. But before he graded the assignment, when I

attempted to talk to him he attempted to explain that he himself had some

personal health issues and that never stopped him from doing his work which was

disheartening for me because this is a Christian university and not just you are

supposed to make these accommodations for me because of my disability but you

represent yourself as being godly and Christian you know. And so, when they

required him to read my assignment he graded it and he graded it so low that I got

a "C" in the course – my only "C" in my entire graduate coursework. So, but, he

was scheduled to teach the final course and I went to my ADA advisor and I felt

like he (the professor) would be punitive to me just because of what had

transpired, and they allowed another, for me to take the course from another

instructor via independent study.

Alex then articulated his current situation in a different faith-based university.

Alex pointed out one difference between his current institution and his previous

institution. The current institution required him to sign new forms documenting his

disability each semester. His previous institutions required this documentation only once.

He further explained how the ADA advisor recently advised him to read the forms

carefully because they had changed:

> So I read the forms and I was concerned because the form indicated that they
>
> would only provide time and a half for quizzes or exams, not assignments. So I
>
> called him, just yesterday as a matter of fact, and explained to him that I would
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> need this extended time with some assignments, certainly not with all. He
>
> informed me that this would be compromising the integrity of the course. So, I
>
> asked how. I needed clarification because I don't understand how me receiving
>
> accommodations for my disability is compromising the integrity of the course.
>
> As a matter of fact, I shared with him that I felt that I was being penalized and
>
> that they didn't want me to be successful in the course work.

In my review of documents I discovered on one of the other college's websites a

chart that compares and contrasts IDEA as it applies to allowable accommodations for K-

12 students versus ADA as it applies to allowable accommodations for college students.

The chart indicated colleges and universities are not required to extend deadlines for

assignments. When he questioned how such an extension of a deadline would

compromise the integrity of the course, he was advised to submit documentation from his

previous institution that he received such an accommodation there and that they would reconsider his request upon receipt of such documentation.

Alex's anger and frustration with his current situation was obvious during the interview in his tone of voice as well as in his verbal indication that he was considering seeking legal counsel on the matter. However, he went on to indicate that he did not wish to employ legal counsel because he was afraid it could have an adverse effect on his success in the remainder of the program or his ability to be admitted into the doctoral program later, which is his ultimate goal. He further stated that he shared this concern with the ADA coordinator who assured him that his concerns will remain confidential and that no such negative impact should occur. However, Alex shared his desire for the dean of the college to know that students with disabilities are being adversely impacted by such policies.

As with all participants, I asked Alex if he would provide any copies of correspondence with university faculty regarding his requests for accommodations and copies of course syllabi. In reviewing his course syllabi I noticed a requirement to purchase access to an application called TK20. Alex did not mention the TK20 in his interview. During a follow-up phone conversation, I asked Alex about the TK20 application. He described it as an online cloud-based storage for documents to be used to collect documents for building a portfolio. He explained how it differed from Blackboard or Canvas in that assignments were not graded in TK20. He said he had no issues in accessing or using the program.

Alex also provided a copy of the email he sent to the university requesting reconsideration of the accommodation of extended time to complete assignments. I

contacted Alex via email about six weeks after the in-person interview to see if things had gotten any better and if his request for the accommodation had been granted. Alex responded indicating he had withdrawn from the university but disclosed additional work demands as the primary reason but also referenced all of the "back and forth" with the school as an additional factor in his decision. He also divulged how the school's dean had attempted to reach him after he withdrew but how he had not made contact with him at that time. In a more recent follow-up with Alex he revealed he had re-enrolled in the program and was continuing with his pursuit of the advanced degree despite the obstacles he had faced.

Brad

Brad was a Caucasian male in his early twenties. Appendix E contains the transcribed interview with Brad. Brad explained how he had a condition that caused him to be blind from birth and had also caused him to begin losing his hearing. He was attending one of the state's major public universities pursuing his first bachelor's degree at the time of his interview. He has since graduated. Brad indicated he uses a Mac with voiceover as his first choice for accessing materials but occasionally uses some Windows-based programs for access to materials. He claimed to have three different screen reader programs installed and uses different ones for different purposes.

According to Brad, the university he attended uses the Blackboard platform. He asserted he had very few, if any, problems getting the materials he needs from the Blackboard platform. He described the Blackboard platform as "fairly accessible" but clarified that it does work better with the Windows platforms than with the Mac platforms. Although his classes met face-to-face, he was required to use Blackboard to

submit assignments, participate in group activities and discussion boards, and access course materials such as PowerPoint presentations and notes.

In addition to the Blackboard platform, Brad described how he often took his tests electronically:

> I take my tests electronically too. They email me a copy of the tests and I take down my answers and I email them back to me, I mean back to them. I don't take my tests over at Student Support Services if I can help it because I don't like being read to.

When his instructors were concerned about test security, they either sent the test to Student Support Services for someone to read it to him or they provided it on a flash drive during class, but he was required to return the flash drive at the end of class.

As for other accommodations, Brad explained that he was allowed extended time when taking tests. If the professor gave an alternate assignment, the professor usually extended the deadline for Brad because developing an alternate assignment typically resulted in additional delays. Like Alex and Claire, Brad claimed that he attempts to get all of his assignments completed on time.

When asked if he has had any particular issues with PDF documents or assignments that require watching videos, he affirmed, "If a PDF contains no static text and only an image then that is hard for me to get around." But to access the text information his solution was to use the Optical Character Recognition (OCR) feature of one of the screen readers.

When I inquired as to whether Brad had encountered any particularly challenging professors or courses, he insisted that although some courses, mainly IT-related courses,

had posed some challenges, his professors had all been receptive to his needs and provided alternate assignments when needed. He further proclaimed that he had never had to communicate with any authority above the professors or student support services personnel.

When probed for details on any particular assignments that may have been inaccessible, Brad described some assignments in a technology course that required animation. He conveyed he was unsuccessful at locating an online presentation tool that would meet his needs and stated, "I cannot do animation." When asked how he resolved the issue, he explained he informed his professor of the issue and the professor provided an alternate assignment. Brad's professor instructed him to research the animation tool and report his findings rather than actually create an animation. I asked how he felt about having an alternate assignment to which he replied, "Yes, if it means I get credit." Later in his interview Brad mentioned in some of his earlier computer application courses he took quizzes in lieu of some assignments because they were not accessible on the Mac. He proclaimed, "But if I had been using Windows, I might would have actually done the assignments just like everyone else was." When asked to describe these assignments, Brad could not recall the details other than they were assignments in PowerPoint, Word, and Excel that could not be done in Mac programs such as Pages, Numbers, and KeyNote.

Claire

Claire was an African-American female in her mid-thirties. She was attending a small faith-based college pursuing a doctorate. Claire indicated she lost her vision when she was a senior in high school. Due to the nature of her eye condition, her vision was

considered stable and she did not anticipate any improvement in her vision. Appendix F contains the transcribed interview with Claire.

After high school Claire attended a local community college. She described her experience there as "impeccable" and "wonderful" referring to the assistance she received from the staff. During her time at the community college she was adjusting to her blindness and beginning to learn braille; therefore, she relied on the use of a tape recorder and a reader-writer to complete assignments. Although Claire is now proficient in the use of braille, including refreshable braille, she prefers audio access to books and textbooks because she can control the speed. She uses braille for writing when she is preparing for a speech or presentation. She relies primarily on JAWS (Job Access with Speech) for screen reader purposes.

After her time at the community college, Claire transferred to one of the state's major universities, the same university that Alex attends, and both Brad and Denise previously attended. She obtained both a bachelor's and master's degree at the university. She described her experience at the university as "the best days of my life." While at the university, she received assistance from a vocational rehabilitation counselor who helped her work with the university to get the technology that she needed. She also received the assistance of a reader-writer.

Claire recalled one professor that she described as not compliant in terms of allowing her accommodations:

> He wasn't very compliant. He didn't like dealing with the accommodations that I needed like maybe a separate area to take my test or access to my assignments earlier than some of my classmates. He didn't like that because it sometimes

takes me longer to get a textbook or a book that we were reading and he didn't understand that. That was my only class that I really had a lot of difficulty with but it did help me to be a better advocate for myself.

Claire described herself as having a quiet side but not shy, a planner and an organizer who likes to stay on top of things. She said one of her professors proclaimed that she comes to class each week "loaded with questions".

As for her current institution, Claire asserted that she has had to educate the staff, specifically the professors, on the issues of blindness. However, she emphatically expressed they had been open and receptive to her needs. As with her previous university, she recalled one professor she encountered as a challenge. Claire did not believe, however, the issues with the professor were specific to her or even to students with disabilities:

Now I am at (College D) where I have had to educate them in the field of blindness, especially my professors. But for the most part they have been very very very very open. I've only had problems with one professor but even before me there have been lines and lines of people who had trouble with him. But other than that they have been open.

Claire claimed the professors at the college were helpful and provided her with the things she needed in advance so that she can be successful. She further claimed she typically tries to stay ahead of her classmates in case she discovers she is missing something she will have time to get whatever she needs.

Claire stated she had some classes that use Blackboard but claimed it was not fully accessible and said the teacher let all of the students submit assignments via email. Claire expressed that she preferred the traditional in-person classes to the on-line format.

When asked about assignments that required access to videos on YouTube or presentations such as PowerPoint, Claire explained how she accomplishes tasks requiring the use of those programs:

PowerPoints, I can do PowerPoints, but because I have such a good support team, like mainly my brother and an old friend from back home that we used to go to school with, who is like a brother, that is my support team, so when I need help like creating a PowerPoint real fast. Or for example, I have a PowerPoint that is due this week, I gave it to my friend. I wrote everything down that I wanted on the PowerPoint and my friend back home, he is going to do it for me while I focus on other bigger, heavier things. So that support team is good. But YouTube videos, to answer your questions, they are pretty easy, but PowerPoints, I can do them but because I want certain pictures on the slides, I am going to hand that to one of my assistants.

Claire also recalled an incident when the professor came to class and asked students to pull up a particular app on their phones. Although she could not recall the specific app, she remembered it being used to answer questions the professor had loaded. She recalled how she was able to retrieve the app but had no prior experience with it to know how to use it on demand. This lack of prior exposure to the app presented a problem.

In reviewing some of the documents provided by Claire, I noticed the syllabi for her classes at her current university included a Flexibility Clause:

> The aforementioned requirements, assignments, policies, evaluation procedures, etc. are subject to change. Student and instructor experiences and needs, as well as emerging knowledge, will be considered in modifying this course syllabus.

This clause was in addition to the section that referenced the Americans with Disabilities Act.

Denise

Denise was an African-American female in her young twenties who lost her vision as a teenager. Denise's interview was only partially recorded due to battery failure of the recorder. Although quotes from Denise are limited in this report, Denise reviewed the notes taken during the interview and draft reports of the findings and confirmed their accuracy. Appendix G contains the transcription of the portion of the interview captured on the recorder.

Denise described her visual condition as having been relatively stable for the past five years, but she was unsure of the long-term prognosis claiming it could get better or worse. According to Denise, her last visual acuity was 20/400 in one eye and 20/700 in the other. After attending a major state university, Denise transferred to a historically black urban university where she was pursuing her first bachelor's degree. She uses large print and magnification to access print materials. She claimed to use a closed circuit television (CCTV) in her dorm room but preferred to use her phone's magnification device during classes.

Denise stated that she did not like screen readers or human readers. She had some training in braille but does not use braille. She prefers to use her residual vision to access materials. She prefers large print handouts in 28 or 30 point sized font to regular print.

When asked to describe her digital classroom experiences, Denise responded with the term "difficult," but blamed the difficulties on the school's not updating the technology and the lack of knowledgeable staff. For example, she claimed the university used 2010 software until 2015 when the university finally updated to Windows 360. She further described the spreadsheet software and presentation software on campus computers as outdated, citing the outdated software as the reason for her inability to submit some of her work through the online platforms required. She believed if she had been allowed to simply email the assignments rather than having to upload and submit them online, she could be more successful.

Denise compared her current university to her previous university. She claimed that her previous university had sufficient numbers of available computers and updated equipment. As for her current institution she claimed, "The school doesn't have any assistive technology, any."

She gave an example of screen magnification software not working properly prompting her to create screenshots of things on her iPad to enlarge them while simultaneously working on her computer to get what she needs:

Like I screen shot it on my iPad to read and then go in and put the answers in, I screen shot everything then go in and put the answers online. So I have the computer in front of me and the iPad beside me just to maneuver the TopHat.

Another example Denise shared during her interview involved the use of Adobe Premier to make and edit videos. She described these assignments as complicated and said she felt everyone knew how to do it but her. She went on to explain how she had been assigned a partner for the class just as other students had been assigned partners for the project, but her partner had not been coming to class. She was concerned her grade in the class would not be good because of the difficulties she had experienced.

Denise shared the same concerns as the other participants regarding the lack of sensitivity to her needs by staff. She recalled an incident when the battery on her phone went out during class interrupting her ability to see the materials. On this particular night, the note-taker assigned to assist her did not show up for class and her professor responded with sarcasm when he asked her why she needed to use her phone for class. She said he later apologized; but when I asked her if she felt his apology was genuine or not, she said she was not sure.

Denise described other problematic incidents. For example, teachers sometimes failed to remember the fact she needs the font enlarged for her and the fact she cannot see well enough to fill in a scantron sheet. One of her accommodations is that she should be allowed to write her answers directly on the test. Another incident involved a school-provided note-taker accompanying her to class. The professor questioned who the individual was and why he was in the classroom. The questioning caused embarrassment to Denise when she had to disclose her disability in front of her classmates because the professor was getting hostile toward the note-taker for being in the class. He, like another professor who also caused her some embarrassment, apologized to her as well as to the note-taker. When asked if she felt his apology was genuine, she said she did feel

that it was genuine but that it was something she had never experienced before. She expressed concern for the note-taker saying she honestly thought "he was about to get beat up by the teacher."

Denise asserted that she had lots of (negative) stories about the teachers at her current university. She claimed that some teachers have refused to enlarge things for her. She believes she failed one class because she did not get what she needed from the teacher. She claimed the teacher left her out of emails and some assignments were provided via email only and were not available in paper format. She even stated she has professors who are not "real teachers" but just someone who works for the university.

Denise recounted an incident when she went to the computer lab to complete an online test. The test was timed; but because of the technical difficulties, she was unable to complete it. Denise believes this resulted in a failing grade on the assignment. One technical difficulty she described included her having to go back and forth between screens causing the computer to freeze and the test to not open for significant periods of time.

Denise shared another concern regarding a group project assignment that was coming due. The assignment consisted of digitally recording and editing a video. She claimed the professor would not give her an alternate assignment. Instead, she had to rely on the work of the others in the group for her grade. She claimed she had no idea how she and other students were being graded in that class because at that time they had only taken one test the entire semester, and the class only met once a week.

According to Denise, the university used the Blackboard platform. In addition to Blackboard, she had one professor who had tried to use an application called TopHat

because, according to her, he wrote his own book. However, because numerous students had difficulty using the TopHat application, the professor eventually posted everything in both TopHat and Blackboard. The issues with TopHat did not seem to be specific to her visual impairment although she claimed screen magnification did not work well with it and described it as hard to maneuver. Overall, she described Blackboard as "kind of easy to use" but also indicated some assignments "don't pull up." She did indicate she has had to participate in online discussions on discussion boards but had not had any difficulty with those assignments.

<div align="center">**Themes**</div>

Personal Support Systems

One common theme among all of the participants is they all indicated they have a good support system of individuals who are willing to help in their time of need and want to see them succeed. Alex indicated he has a strong network of friends and family, including an attorney, whom he calls upon to read materials to him that he cannot access. He has also asked them to assist him in his research in terms of locating articles. When asked if he had encountered any assignments that have been totally inaccessible, he indicated there had not been any.

Like Alex, Brad said that he also has a strong support system:

Family has always been a big support. They support me. They get on me when I'm not doing something right. I've also had help from student support services. Because up until last year, I didn't know how to get anywhere on campus on my own. They would have somebody with me taking me places, staying with me in class, taking notes if I needed it. I still have that too, just not as much as I did.

He explained how in his earlier years the school provided note-taking assistance during classes and while he still used this accommodation, he relied on it less often. When asked to elaborate on the note-taking process, Brad revealed how someone took notes for him during class and then emailed him the notes later so he could have them electronically. Additionally, the note-taker assigned to him for the class would also assist in case he encountered a "visually-demanding exercise" requiring additional assistance for him. I asked Brad how he felt having to rely on the assistance of others or having someone there in class with him taking notes. He conveyed that he is now accustomed to having help and is willing to use the assistance of others to get what he needs.

Unlike Alex, Claire, and Denise, who ask friends and family to assist with reading to them, Brad relied on hired student workers. As for the support of vocational rehabilitation counselors, both Brad and Claire had assistance from vocational rehabilitation counselors in the purchase and setup of some of their technology. Brad explained how the Department of Vocational Rehabilitation for the Blind (VR) purchased his second computer for him, along with a braille display and printer upon his entry to college his freshman year. He further stated how although the VR counselor installed most of the software before giving him the devices, he did most of the setting up of his equipment when he moved into the dorm.

Denise admitted to helping her best friend write a paper in exchange for the friend helping her with assignments in a computer class. Yet later in the interview she indicated she was still failing that class.

Satisfaction with ADA Coordinators and Student Support Services

Another common theme which emerged among most of the participants, was the apparent lack of satisfaction with ADA coordinators and student support services. This lack of satisfaction seemed to stem from the participants' perceptions of how their assigned ADA coordinators and student support services staff lacked sufficient knowledge and training regarding individuals with visual impairments.

During the conversation regarding his need to have a book enlarged or made available in an electronic version, Alex stated, "I get the feeling that this ADA coordinator doesn't understand disabilities." He explained he did not believe his ADA coordinator understood his role because he did not follow through with Alex's request for assistance leaving Alex to resolve the issue himself.

Brad has relied on student support services to transcribe some materials into braille for him. Ironically, when he first enrolled, a braille embosser was not available for the staff to use. According to Brad, the university only recently purchased an embosser purchased. The access to an embosser for braille materials was important to Brad because, although he prefers auditory materials, some materials such as tables used in a money management course and problems in a logistics course are best presented in braille. Like Alex, Brad felt he had to educate the support services staff on his disability.

Claire expressed how she, along with the school's ADA coordinator, sent letters to the professors at the beginning of each semester describing the accommodations she would need. She provided copies of her accommodation requests indicating her requests for early registration, early notification of textbooks required, early access to syllabi, and

an assurance that all online materials are accessible through the JAWS screen reader software.

Denise's self-proclaimed experience with disabilities services was a stark contrast to that of Claire's. She claimed that disabilities services did not communicate with her instructors and that she personally reminded her instructors before every quiz her need for enlarged print. She asserted the disability services contact had been "hard to get in touch with" because he had other responsibilities on campus. However, she believed the university had recently hired someone to assist him.

In reviewing the four syllabi that Denise provided, I found a discrepancy regarding the contact number for the ADA Compliance Officer. Two of the syllabi listed one number as the contact number, but the other two syllabi listed a different number. One of the numbers did correspond to the number listed on the school's accommodations request form. Perhaps the discrepancies in contact information may have accounted for her inability to reach the ADA Compliance Officer.

Although Denise's university had provided her with note-takers during her time at the university, her experiences with them were a mixture of pleasant and unpleasant. She expressed she takes her own notes and does her own assignments "when she feels like it" but did often need note-taker assistance. She explained how she sometimes writes her own notes then later types them. She had different individuals for each semester and sometimes they varied by the day within the same semester. She described one note-taker as a female who tried to "mother" her, indicating she did not want to be "mothered."

Denise described another unpleasant situation that resulted in her firing the note-taker. She claimed a male note-taker falsified timesheets by turning in hours worked yet she knew he did not work and turned in the hours to both the university and VR for duplicate payments.

Reflections and Advice on Self-Advocacy, Independence, and Self-Motivation

I asked participants to reflect on their experiences and to share if there were anything they would change if given the chance or advice they would give to other visually impaired students. Both Alex and Denise emphasized the need for self-advocacy. Alex gave his advice:

> Don't be afraid and sit back and just let it happen to you. You know, I think you have to navigate that landscape pretty carefully though because of repercussions. But I think you really have to be aggressive and ensure that you have what you need in order to be successful. And I've learned that you can't always wait for them, that you gotta do some things yourself. So I would encourage them to not let your disability discourage you from doing what you want to do.

Denise's response was similar:

> It is hard. They don't know what visually impaired means. They think because you are legally blind that you are completely blind. Just because you maneuver like other people doesn't mean you aren't blind. You need to advocate more to get the services that you need. Ask for help.

Brad wished he had been more open to the idea of using Windows rather than restricting his computer usage to a Mac. Brad advises future students:

Try to get as much exposure to it as you can before you get to college so you can know what works and what doesn't. Because you can take all of the technology courses in the world and they will not teach you what works. You have to figure that out for yourself – what works for you and what doesn't work for you.

While not related to technology, but to independence in general, both Brad and Claire wished they had made more efforts to be independent in terms of their travel around campus. Claire described herself during her community college years as timid and reserved and embarrassed to use her cane in public. She wished she had been more independent in her travel. Claire's advice was similar to Brad's:

Go and get training at (VR center name redacted) or wherever they may choose. Learn all they can. And try to learn more than that. But always learn, no matter where you are. Learn how to use Excel, Word, how to pretty much dominate the Internet because it is the way of the world now. Learn how to use refreshable braille, how to use note-takers, Duxbury, if I didn't say it. I mean, anything you can learn, learn. Also, learn to advocate for yourself. Try to stay abreast with what is going on with technology, because it is always changing. I mean, what you learned yesterday, it may change tomorrow. So try to stay up to date on what is going on with technology. Try to stay abreast with what is going on with iPhones and apps, because a lot of classes, you are using apps in classes to access materials. But if you don't stay up to date, it is going to be a problem. And you are going to get behind and it can be a headache, trying to learn things so swiftly.

Conversations with University Presidents

One of the questions I asked the participants during their interviews was "If you had an opportunity to meet with the president of your university, what would you want to say to him or her?" Alex responded as follows:

Well, I think I would like to give him a story that is about 10 pages, blindfold him, and let him listen to it, and then ask him to write, or to respond to specific questions about that story, to help him understand the challenges that we face when we try to use a one size fits all solution to visual impairments. I would also share with the deans that you have folks making decisions about accommodations that could adversely affect your program. So what if I said to one of my co-workers, "no", or to someone else who was visually impaired, "(College C) won't really meet your accommodations"? They won't really do it. (College C) has set the precedent that they won't give you extra time to write a 15 page paper with 8 sources.

Brad's response to this question was very brief. He described his college experience as almost "a perfect college environment," claiming he gets what he needs, including help crossing the street.

Claire conveyed how she would suggest to the college president he provide sensitivity training to both the staff and students. She laughed as she explained how the leader of her cadre during the first semester was uncomfortable with a "blind lady who uses braille," but she said he and others were much more comfortable around her now that they have been around her for a while. She wanted people to know just because she is blind does not mean she is different. Rather it merely means she cannot see as well.

Claire also stressed the importance of having the staff understand the need to work with the ADA coordinator to ensure accessibility:

I would talk to him about talking to his staff, faculty and staff about the importance of working with the ADA coordinator and the office about making sure that they remember the term "accessibility" because some things, well, they need to try it too. They need to get out there and see what we do, because they have no idea. And they need to work with us. People can show them. They would probably be more than willing to show them how things work so they can have an idea. About the term "accessible." About the importance of having braille, because they still don't have braille where I am. I am so used to it, and where to go but that is very important.

Claire, like Alex, believed having staff members spend time in a situation similar to hers, possibly under a blindfold, would give them a better understanding of her situation and needs. Table 2 displays a summary of the thematic findings.

Table 2

Summary of Themes

Question Topic	Thematic Findings
Support systems	Family; friends; student workers; vocational rehabilitation counselors; support staff/ADA coordinator
School-provided support	Lacked sufficient knowledge of visual impairments; need for their assistance before semester begins
Advice to other visually impaired students	Be aggressive; be pro-active; self-advocate; stay current on technology; try various forms of technology

Concerns

Alex professed concern about some of the requirements of future classes, specifically software and online portals he would have to utilize for research and data analysis. He was not sure yet if the screen magnification would work properly. He did not want anyone to feel sorry for him. He proclaimed, "I don't want anyone to feel sorry for me. I don't want anyone to give me something for nothing but I would just like a level playing field for me to be as successful as the next person."

Claire had similar concerns as Alex in terms of applications and programs that may be required of her in the future as part of her doctoral research. She referred to the need for having to organize, classify and categorize information as part of the dissertation proposal process that has her a little anxious.

Summary

I selected four participants for this study. Of the four participants, two were males, and two were females. Three participants were African-American. One participant was Caucasian. Two participants were undergraduate students. The other two were graduate students. Two of the participants were diagnosed at birth as visually impaired while the other two lost their vision as teenagers.

Using constant comparative analysis of the data through the data collection and review process, I identified several recurring themes. The recurring themes emerged from the interviews included the need for strong support systems, professional development training for university staff on the unique and diverse needs of visually impaired students, as well as self-motivation and self-advocacy skills. Although the four participants were at different phases in their pursuit of higher education degrees, were in

different universities, had different degrees of visual limitations and overall different experiences, they had some similarities in responses, primarily in their advice for others and in what they would do differently if they could go back in time and change things.

All four participants conveyed the need to try multiple devices or programs to best determine what works best for the individual users across multiple settings. Two of the four participants used braille. Three of the four participants used screen reader software or human readers for auditory access to materials.

Also common amongst all four participants, was the declared need for training of university staff on the unique, yet diverse, needs of visually impaired students. They believed that such training could increase awareness and sensitivity and decrease apprehension felt by university faculty creating a more welcoming environment for visually impaired students.

Another common theme found amongst the four participants was the presence of a strong support system. Each of the participants described how individuals (family, friends, or rehabilitations counselors) support them and want them to succeed in their educational pursuits. They all seemed comfortable asking for assistance when needed yet all had a strong sense of independence that had contributed to their success. Chapter five discusses how these findings compare and contrast to each other and to the studies discussed in chapter two and includes possible implications and recommendations for future studies.

CHAPTER V. DISCUSSION

Access to the digital classroom is an issue faced by many individuals with visual impairments as the emphasis on technology increases in educational settings. Interviews with four visually impaired college students provided an avenue to express their opinions and allow their voices to be heard while simultaneously providing the findings for this qualitative multiple case study. Two primary research questions guided this study: (1) How are the experiences with digital college classrooms perceived by visually impaired college students? (2) What obstacles do these college students face in accessing, completing, and submitting required assignments and how do they respond to those obstacles? This chapter discusses the comparisons among the four participants and how the findings compare and contrast to the studies discussed in chapter two and includes possible implications and recommendations for future studies.

Case Comparisons

Screen Reader Accessibility

Of the four participants, Alex, Brad, and Claire indicated they use screen readers. Denise has tried using screen readers as an accommodation but prefers magnification. Brad utilizes three different screen reader applications depending on the situation. Alex claimed his present institution was not as mindful of the need for the PDFs to be formatted properly. He described some of the documents as scanned and distorted making them blurry when enlarged and screen reader accessibility almost impossible.

Claire claimed she had "pretty much mastered" PDF documents but went on to clarify how some applications and forms continued to pose problems. She explained how she had to ensure her software, such as Adobe, was updated. She further explained how

she still needed sighted assistance when she encounters situations with inaccessible forms or applications.   Table 3 compares the accommodation preferences of the participants.

Table 3

Cross-Case Comparisons of Accommodation Preferences

Participant	Screen-Reader	Magnification	Braille User
Alex	Yes	Yes	Does not know braille
Brad	Yes	Not applicable	Yes
Claire	Yes	Not applicable	Yes
Denise	Does not prefer but will use if needed	Yes	Learned braille but not proficient; Does not use.

Personal equipment vs. provided equipment

Alex used his personal equipment. Brad used his personal computer but relied on the school's Internet service. He claimed he took his computer wherever he went just in case he needed it. VR provided Claire with an electronic braille note-taker and a desktop when she first started community college. However, she purchased her own laptop because she wanted something portable when she transferred to the university. She indicated that VR assisted with the setup and maintenance of the equipment they provided, but she purchased and installed the software onto the personal laptop. She articulated how the software was easily accessible for her thus enabling her to perform the downloads herself.

Denise initially used a laptop her dad purchased for her when she first went to college. But after transferring to her present institution, VR purchased a laptop for her approximately a year prior to the interview. Denise also mentioned she had been provided with hand-held magnification devices by VR but did not like the devices because they had broken or made too much noise.

Denise claimed when she told the disabilities services person at her school about the issues with the device the representative informed her the school could not provide her with another one because "her boss wouldn't let her get it for her." She believed the university's disability services did not provide any assistive technology and students were required to provide their own if they needed any.

Textbooks, Books and other required purchases

Alex indicated that while most books had been available electronically, either downloadable or on a disc, one required book (not textbook) with extremely small print was unavailable in an electronic format. A local retail copier chain would not allow him to make enlarged copies due to copyright laws. In an effort to magnify the print, he went to his church where he scanned the entire book into a PDF document and saved it electronically in order to view it on his screen at home where he could magnify it.

Brad described the format in which electronic books are sometimes delivered to him as "not fun to get through at all." He stated he prefers to have each chapter of the book in a separate PDF file rather than the entire book in one file. He claimed having everything in one file makes locating specific texts more difficult.

Both Brad and Claire indicated they had considered getting a BookShare account, but neither participant currently had one. They both felt BookShare might help them with access to electronic books. Brad seemed to think a BookShare account would allow him to access electronic books using his iPhone. Claire indicated she felt having her brother skim the pages and find what she needed was much more efficient for her than trying to locate information in BookShare.

Although both Brad and Claire read braille, they did not receive hard-copy braille textbooks. When asked specifically about braille textbooks, Brad responded, "No, that would not be fun," explaining later how he did not want to "have to carry around a bunch of braille book." In terms of the timeliness of receiving the books, Alex, Brad and Claire all claimed they generally received their books in a timely manner. Although they may not receive them before the first day of class, they did not seem to experience any significant delays that caused them any concern.

When asked who assisted them with ordering textbooks and materials, I received a combination of responses. Brad relied on student support services. Alex depended on students support services to assist but had to find creative ways to supplement when they were unable to locate electronic books such as the time he had to scan a book into a PDF document himself. Claire relied on the assistance of the ADA coordinator in earlier years but now knows how to do it herself, sometimes with the assistance of her brother.

Claire claimed at one time she used Kindle to access her textbooks but stopped because of difficulties:

> I used to utilize Kindle for accessing textbooks but I stopped because it was such a headache on my end because it took forever to locate the book on the Internet as well as learning the shortcut keys to take the book back to the top of the page and the bottom of the page and go character by character and it was a headache. I went to several people but they told me they opted out of using it because it was more of a headache than it was a benefit.

Unlike the other participants, Denise preferred regular print font textbooks. She cited high costs and the need for special requests for audio as the primary reasons for her

preference for regular print. As previously referenced, Denise used the magnifier on her phone to see the print. She believed this to be convenient and cost-effective for her.

Discussion of Comparisons to Previous Studies and Major Research Questions

Several comparisons can be made between the results of this study and those in the various studies described in chapter two. The findings of this study yielded a similar portrait of participants as those in the study described by Lazar et al. (2007). Lazar et al. describe screen reader technology as being popular among visually impaired individuals. Three of the four participants in this study used screen reader technology to access their materials.

Denise's story of her interaction with her instructor can be compared to the example Schmetzke (2001) described when he used the example of being able to see someone in a wheelchair struggle to navigate his or her way around physical obstacles but not being able to see someone struggle to navigate his or her way through an online environment. Unlike the other participants whose mobility canes or glasses help identify their visual impairments, Denise's physical appearance did not easily reveal her disability. Therefore, her struggle to navigate the digital environment was less visible for others to see and thus almost went unacknowledged.

The study by Leyser and Heinze (2001) described in chapter two indicated how teachers were not willing to make the necessary adaptations for their visually impaired students. While the participants in this study felt overall their instructors were accommodating, they did indicate there are still some, although few, instructors who have not embraced the notion that accessibility requires cooperation on the part of the instructor.

I found numerous similarities in the findings between the participants in this study and those in the two Fichten et al. (2009) studies. Like the Fichten et al. participants, the participants in this study felt their institution's technology was not as up to date as their personal technology. But unlike the Fichten et al. participants, the two participants who used braille in this study expressed more satisfaction with their experiences with digital classrooms than the two participants with more vision who used magnification for access.

Another similar finding included a possible indication that emails, course web pages, online discussion forums, and Word documents were generally accessible. However, difficulties with some online quizzes and PDF documents existed. Others issues cited by the participants similar to those in Fichten et al. (2009) included accessibility issues with PowerPoints and other materials projected during class, along with time limits imposed during online exams.

I also discovered similarities with solutions to issues experienced by the participants. Approximately half of the Fichten et al. (2009) participants indicated at least one of their three problems was never resolved. In this study two of the four participants felt their issues were not being addressed or resolved. This lack of resolution resulted in one participant withdrawing from his program of study. Solutions cited by Fichten et al. included obtaining materials in alternate formats, devoting more time and effort to the tasks, and seeking assistance from others. Assistance from others included friends, classmates, professors, or e-learning specialists and included having another individual read the materials.

Participants in this study resorted to the same solutions as those in Fichten et al. (2009). They relied on friends, family, classmates, student workers, and VR specialist to

help in times of need.   They also used multiple technologies to access various types of

materials, and like the participants in Fichten et al., most of the participants used screen

reader software.

Research Question 1

The significant findings from the two major research questions are summarized in

Table 4. The first question sought to discover the perceived reality of the experiences of

the participants. Two of the four participants, Brad and Claire, described their

experiences in pleasant terms and seemed generally satisfied thus far with their digital

classroom experiences. The two participants who were generally satisfied used braille

and relied on screen reader software and refreshable braille for access to digital materials.

Table 4

Results of Major Questions

Question	Participant	Findings
RQ1: Experiences	Alex (Print)	Frustrated and not satisfied with current institution's level of support regarding accessibility needs
	Brad (Braille)	Pleasant experience with digital classroom materials
	Claire (Braille)	Pleasant experience with digital classroom materials
	Denise (Print)	Not satisfied with current institution's level of support regarding accessibility needs
RQ2: Obstacles/ Solutions	Alex (Print)	PDFs; availability of books; needs additional time; asked for assistance from friends and family
	Brad (Braille)	PDFs; availability of books; needs additional time; asked for assistance from support services
	Claire (Braille)	PDFs; availability of books; needs additional time; asked for assistance from friends and family
	Denise (Print)	needs additional time; asked for assistance from friends and family; issues with equipment;

The two participants, Alex and Denise, who expressed the least satisfaction with

their experiences rely primarily on large print and magnification and do not use braille.

Alex uses screen reader technology to supplement the large print and magnification. Both

of these participants felt the level of support and cooperation received from their respective institutions significantly impacted their successes. Although both Alex and Denise expressed dissatisfaction with their current situation in terms of accessibility issues, they both expressed satisfaction with their previous institution's level of support and resources. Ironically, although Denise was more satisfied with her previous institution's resources and her ability to access her materials while she attended the previous institution, she claimed her grades were better at her current institution despite the increase in obstacles and lack of cooperation and support she believed she had received.

Although all four participants were visually impaired, two of the participants had enough residual vision to access materials through magnification. The similarities among the findings of the two groups of participants are consistent with the participants in Lazar et al. (2007). As described in chapter two, Lazar et al. compared the results of their study of blind computer users to previous studies of sighted computer users and reported how the blind users responded differently to their frustrating experiences. Blind computer users were more likely to seek a solution and resolve the issue and less likely to give up than sighted users in other studies.

Research Question 2

The second question was intended to reveal the obstacles the participants faced in accessing, completing, and submitting their assignments as part of their course requirements as well as how they respond to the obstacles they faced. Three of the four participants cited issues involving PDF documents as one of the obstacles that hindered their accessibility. These findings were also consistent with the findings of Lazar et al.

(2007) and Fichten et al. (2009) described in chapter two. Problems with PDFs stemmed from the origin of the PDFs. Alex described the problems associated with scanned images or images that contain annotations such as handwriting, underlining or margin notes, and the difficulty screen readers have correctly interpreting these documents.

Another obstacle identified was the availability of books, including textbooks, in digital formats. Overall, participants expressed how if given enough time to locate and order their books, they were generally successful in getting them. However, there were some isolated incidences when the books were not available in a digital format or were formatted in such a way it was still difficult for them to quickly access the information they needed.

As for the submission of assignments, each participant's situation was different and varied depending on the assignment and instructor's preferences and flexibility. But one common need expressed by the participants was the need for additional time. In some cases this was a technology issue, such as timed quizzes or tests, but in other scenarios it was not a technology issue but a visual fatigue issue. The institution's refusal to allow Alex extended time to complete assignments was an obstacle Alex faced which contributed to his decision to temporarily withdrawal from the program. While this obstacle was related to his visual impairment, it was not technology-specific.

Implications

Although this study does not provide the sole basis for recommendations for individuals with visual impairments of the institutions that serve them, if combined with similar studies it does suggest challenges do still exist despite the progress that has been made in the past several years. The findings of this research study confirm the issues

related to the high cost of assistive technology described in chapter two by Cook and Hussey (2002), and Lazar et al. (2007), and Nemeth (1998) are still a concern today. The determination of who bears the responsibility of such cost associated with ensuring access to materials remains to be an issue. Additionally, the findings in this study support the call to action by educational institutions made by Ricoy et al. (2013) where they encourage institutions to strive to eliminate inequalities in terms of access to technology by providing or loaning equipment to students, allowing for additional class time for Internet access, or providing alternate assignments.

While this research study focused on the experiences of only four individuals, it contributes to the limited body of literature related to individuals with visual impairments described by Ferrell et al. (2014), Mankoff et al. (2010), and Hanson (2014) in chapter two. Like Fichten et al. (2009) claim in their study as described in chapter two, implications of this study include the need for students to be proactive in their educational experience and for universities to be proactive in their assessment of campus technologies and training of staff on accessibility issues. This study also strengthens the case for the need for additional research to compare the experiences of students with visual impairments to those without visual impairments with digital classrooms.

Recommendations

There are several areas where additional research could contribute to the cause of enriching the lives of individuals with visual impairments. Computer hardware and software developers, along with assistive technology developers, benefit from knowing and understanding the effectiveness of their developments. Both intentional and

unintentional consequences of new technologies, upgrades, and their compatibility with each other should continually be studied.

The small population size combined with the unique characteristics of those within the population will continue to present challenges to quantitative studies. However, qualitative studies combined with quantitative studies can provide valuable user-specific information that technology developers can use to improve their products. Additionally, institutions should conduct their own institution-specific research to assess the effectiveness of the support they are providing to their students with visual impairments and the technology they make available to them.

Summary

Advancements in technology continue to provide a mixture of opportunities and obstacles for individuals with visual impairments. The goal of assistive technology is to create opportunities not obstacles through increasing accessibility. This can only be accomplished if obstacles are identified and intentionally eliminated by both the developers of the technologies, the service providers, and the end users. With the increased focus on the use of technology in education, institutions should strive to understand the needs of their students.

Just as teachers in brick and mortar buildings strive to make their students feel welcomed as they enter their classrooms on the first day of school, so should instructors in the digital classrooms. Digital classrooms are not likely to be a passing fad. As with other areas of education, a continual need for evaluation and improvements exists.

The identification of improvements is not only an ongoing process but also a shared responsibility. Students have a role in their own success. Although institutions

should encourage students to make their needs known, individuals with disabilities must

continue to advocate for themselves.

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APPENDICES

APPENDIX A

INTERVIEW QUESTION GUIDE

Interview Question Guide

NOTE: The probing questions are only intended to guide the interview process. They are not required to be asked as part of the interview process nor are they to be asked in any particular order.

Introduction: "As a college student myself, I am aware of the reliance on technology, specifically computers and access to the Internet, to access course content and course requirements as well as the submission of assignments. The purpose of this study is to capture the experiences of college students who are blind/visually impaired with digital classrooms. I am curious to know about your personal experiences, thoughts, attitudes and beliefs about digital classrooms.

Demographics: Before you begin sharing about your personal journey through the technology of higher education, would you mind sharing a little bit about yourself first such as your age, your eye condition, how long your have been in college, and your college major?"
> Possible probing questions:
> - What is the long-term prognosis (stability) of your eye condition?
>
> - When were you diagnosed with a visual impairment?

Major Question 1:
Now please share with me what you wish about your personal experiences with digital classrooms in college as a visually impaired student? As you tell me about your experiences I may ask additional questions for clarity or ask you to give me some examples. There are no correct or incorrect responses.

> Possible probing questions:
>
> - What technology do you rely on the most? Where do you use it (library, dorm, coffee shops)? Do you rely on publicly available equipment such as library computers, school Internet service? If so, describe your experiences with these technologies.
>
> - Describe how you communicate your individual needs to your professors? How would you describe your professors' responses to any requests you have made to them?
>
> - How would you describe your participation in the digital classroom such as online discussions?
>
> - Have there been any assignments that you have been unable to access? If so, could you describe how you dealt with it personally and how you addressed and resolved it with your professor(s)?

- As you reflect on your experiences, if you could go back and change anything that you have done, what you do differently and why? What will you do differently going forward?

Major question 2:
What would you say are the biggest obstacles you have faced as a college student with a visual impairment with digital classrooms?

Possible probing questions:

- Have you had to rely on the assistance of others in the initial access of the course(s) or throughout the courses? If so, would you mind describing who those people are/were in terms of their relationship to you or to the school (e.g., friend, family member, school staff/faculty, vocational rehabilitation counselor) and how they have assisted you (e.g., human readers, transcribers, technicians)? How did you determine who could or would help you?

- Have you had any issues with hardware (e.g., computers, Internet access, note-takers, embossers) that you believe may have impacted your accessibility to the courses, content of the courses or requirements or the courses? Describe these issues and how you resolved or overcame them.

- Have you had any issues with software (e.g., screenreaders, delivery platforms) that you believe may have impacted your accessibility to the courses, content of the courses or requirements or the courses? Describe these issues and how you resolved or overcame them.

- Have you had any issues with or barriers that have prevented your access to textbooks or supplementary materials that you believe may have impacted your accessibility to the courses, content of the courses or requirements or the courses? Describe these issues and how you resolved or overcame them.

- What advice would you have for future college students who are visually impaired in terms of preparing for the technology driven demands of college?

- If you could personally speak to the president of your college or university on behalf of visually impaired college students what would you want to say to them?

APPENDIX B

INFORMED CONSENT

Dear Potential Research Participant:

You are invited to participate in a research study that will be used to capture the experiences of visually impaired college students and their access to digital classrooms. You are eligible to participate in this study because of your visual impairment and your need to use assistive technology to access your college course materials. The following details regarding the study are being provided to you so that you may make an informed decision regarding your voluntary participation.

Purpose of the study: The purpose of this study is to capture the experiences of visually impaired college students and how they access the digital content required of their college courses along with their opinions, feelings, and attitudes about their experiences, suggestions for college faculty, and advice for other visually impaired college students.

Procedures: If you agree to participate in this study, I will contact you to arrange a time and place for a in-person interview. The interview will begin with a review of an informed consent form that I will explain and ask you to sign begin I begin asking you questions about yourself and your college experience as a visually impaired student. If you are unable to meet me in person but are willing to arrange a time for a FaceTime or Skype interview, those arrangements can be made. The interview will be recorded. Soon after the interview I will transcribe your comments for future reference. After I have had time to transcribe the conversation and reviewed the notes from the initial interview I may contact you with additional questions for clarity or follow-up. Likewise, I will provide you with a copy of the transcribed notes (electronically) so that you may review them for accuracy.

Time commitment: I anticipate this interview should last approximately 30 minutes.

Risks: There are no known risks or discomforts associated with this study.

Confidentiality: If you do not wish for your name to be part of the released study, a pseudonym can be used to keep your identity confidential.

Withdrawal from the study: You are under no obligation to participate and will be under no obligation to remain in the study if you initially agree to participate. If you agree to participate, you may withdraw from the study at any time with no penalty.

Costs/Compensation: There is no cost implication for you to participate in this study. As a token of my appreciation for your participation I will provide you with a $25 Wal-Mart gift card. Should you choose to withdraw from the study you may keep the gift card.

Benefits of participation: There are no direct benefits from this study. There is indirect benefit anticipated from your participation in the study. The knowledge that will be generated from this study will contribute to a better understanding of the challenges faced by college students who rely on assistive technology for access to college course materials and requirements. This study is meant to be descriptive in nature. It is not

intended to evaluate your knowledge or skills with technology or any subject matter. Nor is it intended to evaluate the services or compliance of any college or university or any of their faculty/staff. All data collected from this study will become the property of the researcher.

Contact information: Should you have any questions or concerns, please feel free to contact me, Jo Ann Malone, at 601-331-3092 or via email at jmalone2@okramail.deltastate.edu. If you have any questions regarding your rights as a research participant, you may contact Delta State University's Institutional Review Board at 662-846-4700 or Dr. Franco Zengaro, the chair of my dissertation committee, at 662-846-4557.

Your signature and verbal approval indicates that you have read and understand the information provided in this consent document and that you willingly agree to participate. A copy of this consent form will be provided to you and is available in braille by request.

_____   _____
Participant signature (date)   Witness: Jo Ann Malone

APPENDIX C

IRB APPROVAL

**DELTA STATE
UNIVERSITY**
Join in. Stand out.

_____

October 31, 2016

Ms. Jo Ann Malone
108 Third Street
Flora, MS 39071

Study: **Journeys Through the Digital Classroom: A Multiple Case Study of Four Visually Impaired College Students**

IRB Protocol number: **16-053**
Approval Date**: October 31, 2016**
Project Start date: **November 2016**

Dear Ms. Malone,

On behalf of the Institutional Review Board (IRB) at Delta State University, I am pleased to inform you that your request for IRB clearance for the project identified above is approved. I see no deception, coercion, or harmful effects to your participants. Participants are voluntary and they do not appear to be vulnerable in any way.

This project is classified as EXEMPT under the following category of exemption:

(2) Research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures or observation of public behavior, unless: (i) information obtained is recorded in such a manner that human subjects can be identified, directly or through identifiers linked to the subjects; and (ii) any disclosure of the human subjects' responses outside the research could reasonably place the subjects at risk of criminal or civil liability or be damaging to the subjects' financial standing, employability, or reputation;

The project <u>does not require further review by Delta State IRB</u> unless you make changes to the protocol that could affect research subject welfare. If so, please file a request for a change to the original protocol.

Sincerely,

Beverly M. Moon, Ph.D.
Institutional Review Board, Chair
DSU ID Number: **IRB00001545**

Kent Wyatt Hall, Suite 239 • 1003 West Sunflower Road • Cleveland, MS 38733 • P: 662-846-4700 • F: 662-846-4313 • www.deltastate.edu

APPENDIX D

TRANSCRIBED INTERVIEW WITH "ALEX"

Transcribed Interview

"Alex"

Note: Before recording began informed consent was explained and signed. It was explained how the interview would be recorded and transcribed. Numbers in parenthesis represent the time stamp of the recording. Wording is presented just as was stated. Sentences may be incomplete or contain slang words or phrases but are the actual words used in the conversation. Identifying information such as school names and names of individuals have been redacted to ensure anonymity and confidentiality.

(Begin Recording)

RESEARCHER: As a college student myself I am aware of the reliance on technology, specifically computers and access to the Internet to access course content and course requirements as well as the submission of assignments. This purpose of this study is to capture the experiences of college students who are blind or visually impaired with digital classrooms. I am curious to know about your personal experiences, your thoughts, your attitudes, and your beliefs about the digital classroom. But before we begin sharing about your personal journey through the technology of higher education would you mind sharing with me a little bit about yourself such as your age, your eye condition, how long you have been in college, your college major and things like that.

ALEX: (0:42) OK, I am (exact age redacted). I am legally blind without my glasses. With my glasses I am teetering right there on the edge. So, um. I went to undergraduate at (School A) and I have a bachelors. I got my bachelors degree there. Then I went to

(School B) and got my master's and I am currently in school at (School C) working on

my specialist in instructional leadership.

RESEARCHER: What about your eye condition?

ALEX: I don't know the name?

RESEARCHER: Ocular albinism? Is that it?

ALEX: Yes, that is it.

RESEARCHER: That was just my guess.

ALEX: Yes, just a little bit.

RESEARCHER: (1:41) Alright, just curious, if you don't mind sharing with me, about

the long-term prognosis or the stability of your eye condition or when were you

diagnosed as being visually impaired?

ALEX: All of my life. I've worn glasses actually since I was actually a toddler. And so

my vision was pretty much stable while I was in college, high school through college and

as I began to work and look at the computer a bit more it has kinda gotten worse,

progressively, well not fast, but it has gotten progressively worse over the years.

RESEARCHER: (2:36) Now please share with me whatever you want to share with me

about your personal experiences with the digital classrooms in college as a visually

impaired student and as you ask me questions and tell me about your experiences I may

ask you some additional questions to clarify or ask you to give me some examples. There

are no right or wrong responses.

ALEX: (2:57) Well, my first experience with the digital classroom was at (College A).

And um, the experience was good because they were mindful of PDFs. They weren't

scanned pictures. They were converted PDF documents, um because sometimes of

course, I have a Mac. Its about a 27 inch Mac and I am able to blow documents up as

large as I need them, magnify them as large as I need them to read them. But sometimes

at the end of the day after working all day and looking at the computer and your phone

reading can be harder at night for me. And so it is easier for me to have the PDF read to

me and if a document is converted to a PDF rather than scanned you can read it. The

computer will read it to you but if it is a scanned picture um, that is a challenge. And

also, so um, (College A) was also great. The process at (College A) was good because I

had an advisor that was assigned to me and it wasn't just to me because I am visually

impaired, excuse me, but it is how they set up their program. They register you for the

courses. When one course ends and then they register you for the next sequence, you

know. I only had to contact the ADA advisor to coordinate receiving my books in a PDF

form so the semester before I was able to just contact him and let him know that I would

be taking you know whatever course the subsequent semester. He would get the books

for me, whether they were on a disc or if he could email them to me however.

(5:10) And, so that was fine. I had trouble with one course. And normally I am able to

keep up with my assignments. You know. We write papers weekly and take quizzes. I

had extended time for quizzes just because you have to read them. I think we had 8

minutes for a quiz and they gave me time and a half to complete the quizzes. And they

gave me time and a half at (College A) to complete the assignments. So, rarely did I need

the time and a half to complete the assignments unless it was a paper where we had to

you know use 15 sources or 12 sources or something like that and then of course the

reading was more and I would need to take advantage of the time and a half. But

typically, those were end-of-course assignments. And so with one instructor, he shared

with me that I knew about this assignment from the beginning of the course so I should have been working on it all along. But, I don't think he understood the challenge it is for me to do the weekly work. And so we ended up into…. When I finished my assignment about a week later and he would not accept it and was going to assign me an F for the course. And um, I went and talked to the ADA advisor and they worked through it and actually he had to grade the assignment. But before he graded the assignment, when I attempted to talk to him he attempted to explain that he himself had some personally health issues and that never stopped him from doing his work which was disheartening for me because this is a Christian university and not just you are supposed to make these accommodations for me because of my disability but you represent yourself as being godly and Christian you know. And so (7:25) um, when they required him to read my assignment he graded it and he graded it so low that I got a C in the course – my only C in my entire graduate coursework. So, but, he was scheduled to teach the final course and I went to my ADA advisor and I felt like he (the professor) would be punitive to me just because of what had transpired and they allowed another, for me to take the course from another instructor via independent study.

RESEARCHER: (8:17) So they took the second grade instead of the first?

ALEX: No, no.

RESEARCHER: Oh, it was a different class?

ALEX: Yes, it was a different class and he was supposed to teach the class and I didn't want to experience that again.

RESEARCHER: I don't blame you.

ALEX: So I finished my master's there. And then I enrolled, currently, in (College C), and it is actually, the end result is a doctoral program. But the way the program is set up you have to I think you finish your specialist in your first 33 hours then the next 30 hours you will receive your Ed. D. (8:56) And so now I am in my 1, 2, 3 – I think my 6th class. 6th or 7th, something like that. When I contacted my ADA advisor because we have to update the forms each semester. We have to sign a new form, talk to your instructor and all of this with each new semester. So when he sent me the form, he emailed me the form and said (name redacted), please, in the email, he said please read the form carefully because the forms have been changed. (9:36) So I read the forms and I was concerned because the form indicated that they would only provide time and a half for quizzes or exams, not assignments. So I called him, just yesterday as a matter of fact, and explained to him that I would need this extended time with some assignments, certainly not with all. He informed me that this would be compromising the integrity of the course. So, I asked how. I needed clarification because I don't understand how me receiving accommodations for my disability is compromising the integrity of the course. As a matter of fact, I shared with him that I felt that I was being penalized and that they didn't want me to be successful in the course work. And I said now you can go back and I have made an A in every class I have been in. And I didn't make a 90-A, I made 99-A, 100-A in all of my courses. (11:00) So um, he asked that I send him a copy of one of the letters from (College A) outlining that they would, that they gave me extended time, time and half on assignments. So that is what I have to do this weekend is go back through old emails and try to find one of those forms to send to him because he believes that once they see that other colleges are making those kinds of accommodations that they will. I

have to admit that I was so teed off yesterday that I thought about going and talking to an attorney. But I don't want that to, because the second leg of the program is I have to be admitted to the Ed. D. portion of the program and I am afraid that if I press, push back too hard, that they will say that my disability will impede me from being successful in the doctoral program and then they won't let me in. And I shared that with him on yesterday and he assured me that this is information that won't be shared with the dean or anyone else and that is concerning to me because the dean needs to know that there are students with disabilities that are being adversely impacted because this ADA officer or whomever are making these decisions around accommodations for students when you have a letter from a physician that clearly says these are the accommodations that this student needs. (12:50) So um, but with (College C) it has been a bit more of a challenge because they often scan PDF, scan documents, for us to read for class and they are sometimes distorted with, you know, dots in the document, you know or the document are so distorted that when you make them bigger they are blurry. And so I just got, I have a really good support system where I am able to say, you know pick up the phone and call a relative or friend to say "Will you read this to me so that I can complete my homework" and about a month ago, as a matter of fact, I called a friend to read it, and she is actually an attorney and she was telling me this makes no sense. You really need to talk to them about it but I just (didn't finish sentence).

RESEARCHER: (13:50) You are trying not to rock the boat?

ALEX: I am trying not to rock the boat, because you know the IHL world is a lot different than the K-12 world. And so if you make the wrong professor made then it can be challenging for the rest of the program. So um….

RESEARCHER: (14:18) The superintendent in me is wanting to comment but the researcher in me can't.

ALEX: OK

RESEARCHER: Okay, so let me see what other questions I have. You talked to me about the technology you use. So are you saying you do use screen readers, you let it read to you?

ALEX: Uh huh (yes)

RESEARCHER: OK, do you use your own personal equipment or have you had to rely on the universities for any equipment?

ALEX: I use my own, personal equipment.

RESEARCHER: (15:00) Would you mind, when this is all over with, possibly sharing with me any copies of emails or whatever, like between, like your correspondence with the ADA advisor, any of that or any of those type documents? I would redact information.

ALEX: Yes, I would be glad to.

RESEARCHER: I would just like to talk about them in my paperwork.

Have there been any assignments that you strictly have just not been able to access?

ALEX: No, not that I recall.

RESEARCHER: As you reflect on your experiences, if you could go back and change anything that you have done or you would do something differently what would that be and why or what would you do differently going forward?

ALEX: (16:00) I'm not sure. I don't know what I would do differently.

RESEARCHER: Alright, you said you do have some friends or whatever that pitch in and help read stuff. Can you talk to me about them? Is it friends and family?

ALEX: Friends and family. They know I am working through this program and so if I need help with something I will ask them to help me read through documents. I have actually asked them to help if I am actually writing a paper about X, Y or Z can you help me find sources. So they will go through and find stuff and say you might want to check out this book or that one. And so, I just don't think that people that have good vision I don't think they really realize the challenge of, because they think that the answer is just to blow it up.

RESEARCHER: Yes, that is not always the solution.

ALEX: (17:09) Yes, because there are times even when it is blown up that your eyes are so weary from looking at a computer screen or looking at a document that you just can't look at it anymore. For me, because I don't read braille, even when I listen to a document, because I guess my mind is accustomed to reading, I may have to listen to it twice, you know what I am saying.

RESEARCHER: (17:39) To process it auditorily instead of visually?

ALEX: Yes, and so it is not the university's fault that I have a full-time job but you know but in your full time job you are reading all day. Or in my job I am reading and writing emails and so some evenings, to do that all day, make it home, then start the second shift, it is a bit challenging sometimes.

RESEARCHER: (18:15) So just curious, then, the program you are in, if it is what I am thinking, it is kind of a start to finish compressed program?

ALEX: Yes.

RESEARCHER: Would it have made a difference if you were in a different program, not necessarily in a different school, but in a different program where you could slow down?

ALEX: Probably, but the challenge there is, and I know that I am really blessed because I am able to drive, but if it rains, at night it is hard for me to see when the roads are wet, and so I started this before Uber was possible.

RESEARCHER: (laughs)

ALEX: (19:04) You know so the online class has helped me in one way, in that regard, that you know I can still go to school and you are right because the program now is, we are on the trimester, so the classes are 5-week classes.

RESEARCHER: So you are cramming a lot into the 5 weeks?

ALEX: (19:27) A lot in 5 weeks.

RESEARCHER: Talk to me a little bit more about the books, textbooks. I know you said at (College A) that they helped you get books on disc or whatever. What about (College C)?

ALEX: (19:52) Uh, huh. Yes, he has been able so far….there is one book that I could not get and he never…. It is *Good to Great – The Social Sector*, a little bitty book and the print was about, the font was probably 11 maybe, 10 or 11. So, you know, I said to him, I really cannot see this book. And he said he is gonna try to get it but he couldn't get it from the publisher and just kind of left me. And so what I had to do was …. I couldn't go to Kinkos and copy it cause…

RESEARCHER: (20:37) copyrights?

ALEX: Yes.

RESEARCHER: Do you ever use like any portable magnifiers?

ALEX: Yes I have tried. I use my phone a lot.

RESEARCHER: Our students used what is called a Smartlux. Its about the size, not much bigger than the size of our phones. It almost looks like a phone and they hold it up and they can change the colors and whatever.

ALEX: I had one of those with a handle when I was in undergrad at (College B). It had a little light in it and so that helped. But what I did was I just went to my church and scanned it as a PDF to myself on a thumb drive and went home and used it that way. (21:30) I get the feeling that this ADA coordinator doesn't understand disabilities.

RESEARCHER: (laughs) That could be the case.

ALEX: You know, I just, he is a nice guys and he really tries to, but I just don't think he fully understands what it means …..

RESEARCHER – What his job is?

ALEX: Yeah.

RESEARCHER: That's interesting. (21:56) Okay, what advice would you have for future college students that are contemplating doing what you are doing – students with a visual impairment, embarking on this journey? What would your advice to them be?

ALEX: Well, I would encourage them to be an advocate. Don't be afraid and sit back and just let it happen to you. You know, I think you have to navigate that landscape pretty carefully though because of repercussions. But I think you really have to be aggressive and ensure that you have what you need in order to be successful. And I've learned that you can't always wait for them, that you gotta do some things yourself. So I would encourage them to not let your disability discourage you from doing what you want to do.

RESEARCHER: If you could speak to….this is almost like what you were saying earlier about the dean, if you could personally speak to the president or dean of your college on behalf of visually impaired college students, what would you say to them?

ALEX: (23:21) Well, I think I would like to give him a story that is about 10 pages, blindfold him, and let him listen to it, and then ask him to write, or to respond to specific questions about that story, to help him understand the challenges that we face when we try to use a one-size-fits-all solution to visual impairments. I would also share with the deans that you have folks making decisions about accommodations that could adversely affect your program. So what if I said to one of my co-workers, "no", or to someone else who was visually impaired, "(College C) won't really meet your accommodations"? They won't really do it. (College C) has set the precedent that they won't give you extra time to write a 15 page paper with 8 sources. You know I just, I would want them…..

RESEARCHER: (24:40) So let me ask you your opinion on this because I think it is very interesting that you just said what you said about blindfolding them. That is actually something that we do as part of our professional development. But there was recently an article that I saw somewhere where there are some people in the blind community that are saying don't do that. That is teaching them to be scared of being blind or something like that, and that was the first time I had ever really heard that take on it. That has always been a part of the professional development for teachers of the visually impaired, to spend time under the blindfold to get a sense of how you have to rely on your auditory and tactile senses – what are your thoughts on that?

ALEX: (25:34) Who wants to be blind or visually impaired? Why would you, you know…. I just don't understand that concept. I think in order for them to really

understand, they need to experience what it is like. Or you know if you could get them some glasses and obstruct their vision somehow and let them understand or feel what the challenge is….I just totally disagree with that.

RESEARCHER: (26:15) Okay, is there anything else you want to add?

ALEX: I just hate I didn't (redacted) because I am really nervous. I am about to take on a research class next and I am really nervous about this class because we have to use some online portal to do our research and to run, I don't know. But we have this online portal to this online program that I am nervous about that it is not going to be accommodating for me.

RESEARCHER: (26:54) Is it like for you to run data?

ALEX: And so I don't know if I will be able to use the mouse or enlarge the screen or you know, I am worried about the stats class. You know – seeing the negative signs. You know, so I thought about – (redacted name) is the dean. And I am really just thinking about going down and sitting down and talking to him. I knew him as a superintendent and he seemed to be ….

RESEARCHER: An approachable guy?

ALEX: Yes, level headed. And so I don't want anyone to feel sorry for me. I don't want anyone to give me something for nothing but I would just like a level playing field for me to be as successful as the next person.

RESEARCHER: I don't really have any other questions but as I go back and transcribe as I think of something I may just call you and ask you. Or if you think of something else, an experience that you have had that you think, oh yeah, I should have told her about that,

call me or just shoot me an email. Any documents you may have, one of the things that I

would like to see if you don't mind is the syllabi of some of our classes.

ALEX: (28:30) Okay.

RESEARCHER: If you can just email me those.

ALEX: From the specialist or the masters?

RESEARCHER: Any of it.

ALEX: Okay.

RESEARCHER: And then, like I said, any of your correspondence, where you have had

correspondence with your professor about your situation, or the ADA coordinator, that

would be artifacts that I could go through, I would appreciate it.

ALEX: Okay.

(End of recording)

APPENDIX E

TRANSCRIBED INTERVIEW WITH "BRAD"

Transcribed Interview

"Brad"

Note: Before recording began informed consent was explained and signed. It was explained how the interview would be recorded and transcribed. Numbers in parenthesis represent the time stamp of the recording. Wording is presented just as was stated. Sentences may be incomplete or contain slang words or phrases but are the actual words used in the conversation. Identifying information such as school names or names of individuals have been redacted to ensure anonymity and confidentiality.

(Begin recording)

RESEARCHER: We are recording now. So let me go through the purpose of the study and what I would like for you to share with me. As a college student myself I am aware of the reliance on technology specifically computers and access to the Internet to access course content and course requirements as well as the submission of assignments. The purpose of this study is to capture the experiences of college students who are blind or visually impaired with digital classroom. I am curious to know about your personal experiences, your thoughts, your attitudes and your beliefs about digital classrooms. Before I ask you to begin sharing your personal journey through higher education, first would you mind sharing a little bit about yourself such as your age, your eye condition, how long you have been in college, your major – anything like that before we get started.

BRAD: I am (exact age redacted), I am a senior here in college, studying information technology and the eye condition is Norrie. It is pretty rare. It is the disease that caused

me to be blind from birth. And it is also the disease that caused me to start losing my

hearing at age 9.

RESEARCHER: (1:30) What is the long-term prognosis of your eye condition?

BRAD: What is that?

RESEARCHER: What about the long term-prognosis of your eye condition? It's pretty

stable?

BRAD: Yeah, I've never been able to see.

RESEARCHER: So now if you will share with me whatever you want to share about

your personal experience with the digital classroom in college.

BRAD: (2:03) I've never usually had any problems. I am able to get the materials that I

need. Eventually I can get them online on Blackboard. Blackboard is fairly accessible on

all of the platforms that I use it on. There has never really been a problem with it.

RESEARCHER: (2:27) So, what technology do you use?

BRAD: I have my Mac with voiceover. And when I use Windows I have three

screenreaders I can use. I have 3 installed – JAWS, System Access and NVDA –

NonVisual Desktop Access.

RESEARCHER: Okay, say those again, JAWS?

BRAD: JAWS, Systems Access, and NVDA

RESEARCHER: NVBA?

BRAD: NVDA – Non-Visual Desktop Access

RESEARCHER: Non-visual desktop access?

BRAD: Yes, put that in parentheses.

RESEARCHER: (3:10) You said these do work with Blackboard. Any particular one that works better than the other?

BRAD: Windows better than Mac. That is the one thing I prefer Windows for, using Blackboard.

RESEARCHER: So talk to me about, talk to me about the Blackboard platform. What all do you have to do electronically in Blackboard?

BRAD: (3:48) I submit assignments. I participate in group activities. Lately I've been contributing to discussion boards in my classes and a lot of the course materials such as the PowerPoint slides used for the classes and notes, those are also on Blackboard and that is where I get those.

RESEARCHER: (4:15) So, have you had any issues with PDF documents or having to watch videos, any type of assignments that have been particularly difficult?

BRAD: If a PDF contains no static text and only an image then that is hard for me to get around. Well it was hard for me to get around. I figured out a solution though.

RESEARCHER: (4:39) Okay, what was that?

BRAD: I use the OCR (Optical Character Recognition) feature of JAWs to get the text from the image. It works pretty well.

RESEARCHER: Have you had any particular courses or any particular professors that have been more challenging than others?

BRAD: I've never had a problem with any of the professors. Some of the courses – a lot of the IT related courses can be a little challenging because they are so visual. But the professors have always been willing to work with me, and they have been. If I need alternate assignments, they give me those. And they are very receptive to my needs.

RESEARCHER: (5:40) Have you had to rely on others to help? Talk to me about friends, family, ADA coordinators, Voc-rehab specialists, any of those. Talk to me about that.

BRAD: Family has always been a big support. They support me. They get on me when I'm not doing something right. I've also had help from student support services. Because up until last year I didn't know how to get anywhere on campus on my own. They would have somebody with me taking me places, staying with me in class, taking notes if I needed it. I still have that too, just not as much as I did. Also, well, thats kinda about it in the classroom setting.

RESEARCHER: So how have they helped you in the classroom setting?

BRAD: They take notes.

RESEARCHER: How do they get those notes to you?

BRAD: Email- they write them up then email them. They stay with me in class in case there is a visually demanding exercise that I may need help with.

RESEARCHER: So how does that make you feel in terms of relying on someone to be there in class with you to take notes? Does that bother you?

BRAD: I'm used to it now? I try to get all the help I can get. If I have to use other people to get what I need I am willing to do it.

RESEARCHER: (7:30) So what about the technology in terms of the school's technology versus your personal technology. How much do you rely on the school's technology versus your own?

BRAD: Like what?

RESEARCHER: Like devices, like computers, Internet, embossers?

BRAD: I have to use the Internet here. That's a no go. But I never use any of the computers on campus. I always use my computer.

RESEARCHER: (8:00) Is that your preference or is that because theirs don't work for what you need?

BRAD: I could, but I just like using my own computer. I take it with me wherever I go. So if I need it, it is always there.

RESEARCHER: (8:29) What about transcribing materials?

BRAD: I have gotten a few things in braille before. Last semester I took a logics course. That was pretty – I need to have those things brailled so I could look at them and be able to solve the problems. And this semester I am also taking personal money management. I've gotten some of the tables for that brailled so that I could see how to solve the problems.

RESEARCHER: Who is doing that for you?

BRAD: Student support services. (Name redacted) in student support services.

RESEARCHER: Are they doing that on a timely basis? Are they getting it to you quick enough for you?

BRAD: Oh yes. I've never had a problem with that.

RESEARCHER: (9:30) Talk to me about how you communicate your needs to either your professors or to the school. How do you go about telling them what you need?

BRAD: If I find that I need something I tell them after class or via email and I usually get it. I've never had to deal with any higher authority than the professor to get what I needed. And student support services, I tell them if I need them.

RESEARCHER: So you said, there has really not been any assignments that you have not been able to access. You've been able to access everything pretty good?

BRAD: Mostly.

RESEARCHER: Any of them that you haven't that you want to talk about?

BRAD: Just like things in a few of my classes like we are doing – one of the assignments was animation. I cannot do animation.

RESEARCHER: What was the class?

BRAD: Emerging Technology – is what I am taking now. There has been several assignments. Emerging technology – the animation, the online presentation tool – I couldn't find one that worked. The only presentation tools that work are things that you actually have to have installed like PowerPoint on Windows, on Keynote on the Mac.

RESEARCHER: (11:09) So how do you work through that?

BRAD: I tell my professor.

RESEARCHER: Like how is it resolved?

BRAD: He gave me an alternate assignment for that – to research the online animation tool and write a report about it. I didn't have to actually do the animation.

RESEARCHER: Are you okay with that?

BRAD: Sure.

RESEARCHER: You are okay with the alternate assignment?

BRAD: Yes. If it means I get credit.

RESEARCHER: As you think about your college experience is there anything that you wish you could have done differently or that you could go back and change – what would that be? (long pause)

BRAD: (12:04) Hhmm, I probably could have worked harder at trying to be more independent around campus my first year. I tried but there were still a lot of places that were kinda difficult for me to get to. My first semester, my schedule was everywhere. So it was kinda difficult for me to – I don't remember where all of those places were but I could have at least tried to learn where some of them were. That was my main hurdle for a while was the mobility thing.

RESEARCHER: What about technology-wise?

BRAD: For a whole year, I didn't want to use Windows.

RESEARCHER: Oh, why is that?

BRAD: Simply because I thought the Mac was better until I got into one of my IT classes and it did a lot with Word. I need to be able to access Word so I had my department get me Windows 7 and Microsoft Office 2013. That was the latest one back then.

RESEARCHER: So are you saying you would have used Windows earlier than what you did?

BRAD: Yeah, I think so because if I had had Windows I would have been able to do some of the work in my computer applications course instead of just taking quizzes. That is what I was doing because I was using the Mac and I couldn't access things like Word and Excel and PowerPoint on the Mac. I can now but I couldn't then. I was just taking quizzes in those classes to try to get the credit for it. But if I had been using Windows I might would have actually done the assignments just like everyone else was.

RESEARCHER: Like what kind of assignments?

BRAD: (14:07) I can't even remember what they were now. Just things that could be done in PowerPoint and Word and Excel that couldn't be done in things like Pages and Numbers and KeyNote. I don't know, maybe they could but I didn't do those assignments. I always just took quizzes in that one particular class.

RESEARCHER: What class was that?

BRAD: It was computer applications, my first semester.

RESEARCHER: Alright (14:49) I am going through my list. Hold on. What would you say are the biggest obstacles that you have faced, in terms of technology?

BRAD: (15:08) For a while it was the whole image and PDF thing. I couldn't read the images and that made getting assignments turned in a little difficult for me because I couldn't read the images. (Noise) A lot of the assignments are really visual. Well, I don't think it is visually, I think the main problem is the things he wants me to do don't really work that well like the online presentation tools – I couldn't find one that worked. It was kinda difficult.

RESEARCHER: So have you just had to figure it out on your own – what works or have they helped you figure out what works?

BRAD: Student support Services – they learn from me. Because they don't, well they just got an embosser over there a year ago if you can believe that.

RESEARCHER: Wow.

BRAD: Yeah, they have two now but they didn't get them until last year.

RESEARCHER: Would you mind (Brad), later on, it doesn't have to be today, sharing with me, like emailing me, some of your course syllabus or syllabi for some of these particular courses that you have found to be more challenging than others so that I can

include them as part of my document review assignments in terms of what those

assignments are so that I can see what those assignments are?

BRAD: Some of them I'm not sure I still have. (17:11)

RESEARCHER: That's okay. Like the ones from this semester. The ones you are saying

the classes you are in now that you have found to be a little bit more challenging. Also,

any email correspondence that you have had between your professors or the ADA

coordinator. If you wouldn't mind giving me or emailing me a copy of those that I can

include as part of my backup, your identifying information will be taken out.

BRAD: Alright.

RESEARCHER: So there is not anything that is going to be included that will include

your name, your professors' name, or the university's name. That will be taken out. Go

back and let's talk about textbooks. Have you had any issues with getting your

textbooks?

BRAD: I get them. But the format they are in is not fun to get through at all. The way I

like it, I've gotten it 2 or 3 times is where they have each chapter of the book in its own

PDF file. Most of the time it is one big ole PDF file with all of the chapters in the book

and it is almost impossible to find anything in it. (18:33) I thought about getting a

BookShare account to try to fix that.

RESEARCHER: So you don't have a BookShare account?

BRAD: I don't have one. I'm thinking about getting one though. I'm a student, I can get

one for free. I think.

RESEARCHER: How do you think that would help? (18:55)

BRAD: It would put the books in a format that I could read easily, more easily, in the DAISEY book format so that I can read them on a daily reader on my iPhone – jump directly to the page you want, stuff like that.

RESEARCHER: What about getting your books on time? Have you gotten them quickly? Or have you had any issues where you just haven't been able to get them at all?

BRAD: Not usually. It is usually, I get some on the day class starts, and some a couple of days later. But it is never usually any worse than that.

RESEARCHER: (19:43) Are they all electronic or are there any in actual braille?

BRAD: No. That would not be fun. (laughs)

RESEARCHER: So they are all electronic?

BRAD: Right.

RESEARCHER: Who helps you do that? (20:02)

BRAD: (Name redacted) in Student Support Services. (He spells out name.)

RESEARCHER: (Name redacted)?

BRAD: (Name redacted), he is the guy who talked to us that day.

RESEARCHER: I wasn't here, remember.

BRAD: I thought you were here.

RESEARCHER: No, No. I wasn't here that day.

BRAD: I missed that. I thought he was talking to you.

RESEARCHER: No. I was out of town. (20:34)

BRAD: Oh.

RESEARCHER: So is that what you prefer? Electronic?

BRAD: Yes. I don't have to carry around a bunch of braille books. Especially since braille books take up a lot more than one volume. I learned that at the (school name redacted).

RESEARCHER: So talk to me about how you turn in your assignments electronically?

BRAD: I submit them via Blackboard.

RESEARCHER: So you just type them up into Microsoft Word?

BRAD: Yes. And I submit them in Blackboard. (21:20)

RESEARCHER: What advice would you have for other college students in terms of the technology piece in helping them to prepare to know how to make decisions – just any advice you would give them?

BRAD: Try to get as much exposure to it as you can before you get to college so you can know what works and what doesn't. (22:03) Because you can take all of the technology courses in the world and they will not teach you what works. You have to figure that out for yourself – what works for you and what doesn't work for you.

RESEARCHER: If you could personally speak to the president of (College B) today, on behalf of blind or visually impaired college students, what would you say to him?

BRAD: (22:47) Hhmm. (long pause) That's a hard one. I really don't know because I really haven't had that many bad experiences. Everything is almost what I would like – in a perfect college environment. I get what I need. I get the help that I need, when I cross the street, things like that. And the technology, all of that is good.

RESEARCHER: Alright, is there anything else you want me to know? Anything else you want to share?

BRAD: In regards to technology, I've pretty much shared it all. One other hurdle I didn't mention thought is professors who are not fluent in English.

RESEARCHER: Okay.

BRAD: That is really a problem.

RESEARCHER: How?

BRAD: You can't understand what they are saying. I already can't hear that well and it is a problem for me, not being able to understand what the professor says. It kinda takes away from me going to class everyday. If I go to class and I can't understand the professor, what am I there for?

RESEARCHER: How many of your classes (name redacted) are face to face versus online?

BRAD: I have never taken an online college class.

RESEARCHER: (24:40) So all of your classes are face to face?

BRAD: Right.

RESEARCHER: But how much of the face to face class is still relying on digital? Because you are talking to me about Blackboard – you are still turning in assignments

BRAD: Electronically (25:05)

RESEARCHER: Electronically right?

BRAD: Right. Unless my teacher is a real stickler about it and I have to print something out and turn it in in class, I do that, but mostly it is all Blackboard.

RESEARCHER: Okay, you were saying you participate in class discussions electronically, so even though the classes are face to face, how much online discussion is there?

BRAD: Not much, and the two classes that I have done that in, one class we had one case discussion and in the other we had two.

RESEARCHER: Have you had any trouble with that? (26:06)

BRAD: No. It is all accessible. I can do it all.

RESEARCHER: What about time extensions? Have you had to ask for any type of extensions on time?

BRAD: Sometimes. Sometimes I have like when I am turning in an alternate assignment. Because if he knows I can't do it he will need some time to come up with something else and I will be able to get it in past the deadline. But not usually on tests though. I got through with my test this morning in 20 minutes.

RESEARCHER: Oh wow.

BRAD: (laughs) That's another thing. I take my tests electronically too. They email me a copy of the tests and I take down my answers and I email them back to me, I mean back to them. (27:11) I don't take my tests over at Student Support Services if I can help it because I don't like being read to.

RESEARCHER: Okay, but so have you had to do that?

BRAD: Do what?

RESEARCHER: Have you had to take your tests over there to be read to?

BRAD: Several times. If a teacher is really nervous about the test getting out, you know, getting out to their students, they won't send it to me in an email. They send it to student support services and I have to go down there and take it. That doesn't happen often but it has happened.

RESEARCHER: So when that happens, do they read you the test? Or do they just let you take it there?

BRAD: At student support services they read it to me because that is the only way. They email it, then they print it out, in print and that is how they – and they fill in the scantrons.

RESEARCHER: (28:24) So have you ever asked for that to not happen? For them to specifically do it another way?

BRAD: Yes. And that brings back what I said before. They don't want to do that because they think if they email me the test that they want to make sure that I don't send it to anybody else. I'm not gonna do that but they don't know that. So, I have one teacher now who was worried about that so she gives me the test on a jump drive. I open it on my jump drive and I save my answers to the jump drive so nobody else gets it.

RESEARCHER: (29:10) So when they did that, when they gave it to you on the jump drive and you saved it on a jump drive did they do that at support services?

BRAD: No.

RESEARCHER: They just gave it to you and hoped you didn't share it with anybody?

BRAD: No. The teacher gives it to me on the day of the class. She has a keyring attached to it so I can't take it away.

RESEARCHER: So you did it during class?

BRAD: Yes, she gives it to me during class and I gave it back to her when I am done taking the test. (29:40)

RESEARCHER: So you said you haven't had to use extended time very much. Do you ask for it just to be safe?

BRAD: Sometimes. That automatically comes with taking tests over at student support services. I think it is like 3 times. That is why most people want to take it there, because of the extra time.

RESEARCHER: What about extended time for just submitting your assignments? You said when they have to come up with alternate assignments do they usually give you extra time?

BRAD: Yes, that is usually about it. I tried to get all of my assignments in on time. (30:45)

RESEARCHER: So is it just the people in student services that read to you when you need to be read to or do you have friends or family that do that?

BRAD: No, they read it to me. They hire student workers and it is usually the student workers that read me the tests and fill in the scantrons.

RESEARCHER: What about when you first moved here, when you first moved into the dorm, your computers, your Internet, when you got set up in here, who helped you get all of that technology taken care of? Logged in to the Internet, your computer set up, who did all of that for you?

BRAD: What was that guys name? (name redacted) over at (vocational rehabilitation center name redacted)

RESEARCHER: So a voc rehab counselor?

BRAD: Yeah. (32:01) They bought me the second computer. They bought me my braille display, and that printer over there. I don't know why they had to buy me such a big printer though. See how big that thing over there is. That is one of the reasons I can't have a roommate – because that printer is so big. It covers up the whole desk.

RESEARCHER: It looks like it might be a copy machine and a printer.

BRAD: Yes, I don't know why they bought me that printer, that big of a printer, but they did.

RESEARCHER: Maybe it was on sale.

BRAD: (laughs) Oh my. (32:34)

RESEARCHER: So talk to me about the roommate situation.

BRAD: I've never had one.

RESEARCHER: Is it just because you don't want one?

BRAD: No, it is one of those things where they think I have a lot of stuff.

RESEARCHER: They who? The school?

BRAD: No. Huh? What do you mean they?

RESEARCHER: You said they think you have a lot of stuff.

BRAD: I do, but still.

RESEARCHER: Do you think it is because roommates don't want to room with

you because you have a lot of stuff?

BRAD: No, I don't know. I'm not sure what the whole reasoning behind it is. But I

have never had a roommate. The only time I had one was when I was in (town redacted)

when I went to the (name of center redacted) last summer. It was interesting.

RESEARCHER: How? (33:35)

BRAD: (laughs) Those walls in there are so thin you can hear a fly walking on the other

side of it.

RESEARCHER: (laughs) So did you not like having a roommate? Or did you like it?

BRAD: No, not really.

RESEARCHER: You didn't like having a roommate?

BRAD: No.

RESEARCHER: So you actually like having a room by yourself?

BRAD: Yes! (smiles) Yes, I do. I can stay up as late as I want, get up as late as I want. Do whatever. The top bunk is up there just to save space.

RESEARCHER: (34:20) So Voc-Rehab bought your computer and your braille display and your printer?

BRAD: Uh huh (yes)

RESEARCHER: When you first came? When you first came to (College) ? Is that when they did that?

BRAD: They bought them before, but I didn't get them until I got here. My mom, I think she went to pick them up from (vocational counselor name redacted) and she brought them up here the weekend before I started school.

RESEARCHER – So you have had the same equipment the whole time you have been here?

BRAD: Yeah.

RESEARCHER: Okay. Do they come help you set it up every year?

BRAD: No.

RESEARCHER: Just that one time initially?

BRAD: Right, no, they never had to come. They never came up here.

RESEARCHER: Then who actually, like when you moved into the dorm, who helped you get it all set up and working?

BRAD: I mainly did it all on my own. I have to move it every year. The WiFi never disconnects. I just have to come in here or go anywhere on campus where there is a good WiFi signal and I am good to go. I think (vocational counselor name redacted) did install a few things on the computer. He installed Microsoft Office 2011 on the computer and the printer software. But that is all he did. I took care of everything else once I got it in here. (35:45) Because MACs have the voiceover built right into them. You don't have to install anything. That's why I didn't want to use Windows. That's why MACs are so much better than Windows.

RESEARCHER: So do you move home every summer and come back?

BRAD: I didn't go home this summer.

RESEARCHER: So you stayed in this room?

BRAD: Right.

RESEARCHER: So you haven't had to take everything down and move?

BRAD: I have not moved in over a year. That's nice.

RESEARCHER: Is there anything else you can think of that I haven't thought of?

BRAD: No.

RESEARCHER: Okay, when I go back home I will transcribe everything we have just talked about. And if I have any questions over the next few weeks or even months I may just call you and ask you to clarify or may ask you some more questions. But hopefully from this point we can do it all by phone or email.

BRAD: Okay.

RESEARCHER: The main thing is if you don't mind going back through some of your emails, and your courses that may still be in Blackboard or from this semester send me any correspondence.

BRAD: They keep everything in Blackboard. I don't see why they don't get rid of some of that stuff. Because I have classes in blackboard that I took 3 years ago. Everything is up there.

RESEARCHER: Well that may not be a bad plan because when it gets closer to graduation time in case there is any discrepancy on what classes you took or what you made in a class you will have those records. So it may be a good thing.

BRAD: Screen shot it?

RESEARCHER: There you go. Okay, anything else you want to share with me.

BRAD: I think that is about it.

RESEARCHER: Sounds good. I will turn the recorder off now.

(Recording ended.)

APPENDIX F

TRANSCRIBED INTERVIEW WITH "CLAIRE"

Transcribed Interview

"Claire"

Note: Before recording began informed consent was explained and signed. It was explained how the interview would be recorded and transcribed. Numbers in parenthesis represent the time stamp of the recording. Wording is presented just as was stated. Sentences may be incomplete or contain slang words or phrases but are the actual words used in the conversation. Identifying information such as school names and names of individuals have been redacted to ensure anonymity and confidentiality.

(Begin recording)

RESEARCHER: As a college student myself I am aware of the reliance on technology, specifically computers and access to the Internet to access course content and course requirements as well as the submission of assignments. The purpose of the study is to capture the experiences of college students who are blind and visually impaired with digital classrooms. I am curious to know about your personal experiences, your thoughts, attitudes and beliefs about digital classrooms. Before you begin sharing about your personal journey through the technology of higher education, would you mind sharing a little bit about yourself first such as your age, your eye condition, how long you have been in college, your college major, etc.

CLAIRE: Okay, I am (exact age redacted) years old. My eye condition is Optic Nerve Hypoplasia, no Optic Nerve Atrophy (she corrected herself) and I have been in college since the Fall of 2015. My major is that I am getting a doctor of professional counseling degree at (college D) and are there any more questions in there?

RESEARCHER: The long-term prognosis of your eye condition? Like when you were diagnosed with an eye condition.

CLAIRE: Okay, I was diagnosed in 1998. I was a senior in high school so it is pretty much a stable condition at this time.   And that is where it stands.

RESEARCHER: Okay, so now if you will, just share with me what you wish about your personal experiences with digital classrooms.

CLAIRE: What I wish? Okay, I wish that they were a lot more accessible pieces of technology. There are a lot of things out there for us to use but it isn't as accessible as it needs to be. There are still some things I have to get someone with sight to assist with. Because myself, along with professionals in the field blindness, are still trying to work through some kinks, as with Blackboard. It is accessible but not fully accessible. So I just long for the day when we can have full access to technology as our sighted peers.

RESEARCHER: So tell me what you mean but it isn't accessible. How? (3:00) What specific issues have you had with it?

CLAIRE: With technology, just say with Kindle, accessing Kindle books. I used to utilize Kindle for accessing textbooks but I stopped because it was such a headache on my end because it took forever to locate the book on the Internet as well as learning the shortcut keys to take the book back to the top of the page and the bottom of the page and go character by character and it was a headache. I went to several people but they told me they opted out of using it because it was more of a headache than it was a benefit.

RESEARCHER: So who are these people you say you went to? (4:06)

CLAIRE: People that utilize technology like people who teach assistive technology classes, computer techs that work with accessible technology (4:23) and the JAWS software, NVBA and all of that.

RESEARCHER: Are they professionals in visual impairment?

CLAIRE: Yes mam, they are professionals in visual impairment.

RESEARCHER: Okay, talk to me about the college you are in now and if you want to talk to me about the other colleges you have been in. Because I know that is not the only college you have attended in terms of their willingness to work with you, how receptive your professors are, assignments, etc.

CLAIRE: Okay. (4:54) I first went to (College E) in (name of town redacted). I went there a year after I lost my sight. So when I lost my sight my senior year I went for training for about a year to regain skills then I started college. It was an impeccable experience. They were very very willing to help me concerning the technology that I needed, and the O&M. Some places were hard to get to. They were very very willing to assist and they got me through those process. They were very nice and very helpful. Because at that time I didn't really know a lot of braille and so I used a tape recorder so I had to have reading/writer. But it was a wonderful experience at (College E). After (College E) I went to (College B) where I obtained my bachelors and masters degrees. That campus is huge. I had a lot of trouble getting around that campus but if I needed a reader/writer they were willing to provide that. My rehab counselor that was in that area, we worked hand in hand with (College B) to get the technology that I needed and whatever I needed. So that was some of the best days of my life at (College B) – as well as (College E). All of the professors were very compliant except one that I had at

(College B). He wasn't very compliant. He didn't like dealing with the accommodations that I needed like maybe a separate area to take my test or access to my assignments earlier than some of my classmates. He didn't like that because it sometimes takes me longer to get a textbook or a book that we were reading and he didn't understand that. That was my only class that I really had a lot of difficulty with but it did help me to be a better advocate for myself. Now I am at (College D) where I have had to educate them in the field of blindness, especially my professors but for the most part they have been very very very very open. I've only had problems with one professor but even before me there have been lines and lines of people who had trouble with him. But other than that they have been open.

RESEARCHER: Others with disabilities? (7:54) or just other students in general?

CLAIRE: Other people in general, other students in general. But other than him, I am usually ahead of everyone else in class because I start early in case I am missing something I can get it but they are very helpful. They get me everything early and they are nice people. So that has been my experience thus far.

RESEARCHER: So lets talk about the technology piece in terms of are there assignments that they ask you to do that you struggle with being able to access or being able to turn them in like they want them? What type of obstacles have you faced or what type of work-arounds have you had to come up with to be able to get them what they want or to get what you need?

CLAIRE: (8:51) The textbooks have been the main hurdle. I started off with Kindle and as I stated, it didn't work. So I tried the app on my phone as well as using or accessing it on my computer but neither were successful. So mostly, if I can't utilize the audible app,

well mostly I use that for hardback books and paperback books but not textbooks. I access quiet a few books on my audible app but other than that my faithful brother, biological brother, he has been a trooper. He will read whatever I need. That is where the sighted help comes in – when the technology piece doesn't work. Now what I am going to start doing more is using BookShare.

RESEARCHER: So you don't use BookShare now?

CLAIRE: No, because school is so fluid, it moves so fast that by the time I access it and sit there and transcribe everything I need from it my brother could have read it in half the time, maybe even quicker than that. So, it is just what works for the time being but no, I haven't started accessing them on BookShare for that very reason. Because what I need he can skim the page and we can go from there and it just moves faster for what I need now but will I use BookShare? Absolutely. But for what I am needing and it is moving so fast, that is when I use my brother.

RESEARCHER: So do you prefer to access your books auditorily or do you prefer – are you listening to them or are you using refreshable braille display or what?

CLAIRE: (11:15) Because I lost my vision so late I use a lot of audio. But I do use a lot of braille as well like when I am doing speeches in my classes and presentations. But concerning my textbooks, no, totally audio. For time sake, I can speed it up, slow it down, so that is how I do it.

RESEARCHER: (11:40) What about turning in your assignments? How do you do that?

CLAIRE: Well, mostly via Internet, via email. I have one professor at this time, she likes it in hand, so everything pretty much is on the Internet and via email.

RESEARCHER: So do you use the Blackboard app or do you email them directly?

CLAIRE: This is my fourth, no wait, one, two, three, four, fourth semester. And this is my first class where we use Blackboard. But we really don't use it in class so I haven't had to use it this semester. (12:25) She sent us the syllabus and the assignments we had to do because it is an Internet class and as long as we email them to her we don't really have to check in via Blackboard.

RESEARCHER: So how many of your classes are online versus face to face?

CLAIRE: (12:45) Everything has been face to face. I go to class twice a week. This is my first class via the Internet. It is my only Internet class in my four semesters. I like the traditional way so I go in to class.

RESEARCHER: (13:10) Okay have they given you any assignments, for example, to create a PowerPoint, or to watch a YouTube video or anything that you have felt was just not accessible?

CLAIRE: No, YouTube is pretty easy to access. PowerPoints, I can do PowerPoints, but because I have such a good support team, like mainly my brother and an old friend from back home that we used to go to school with, who is like a brother, that is my support team, so when I need help like creating a PowerPoint real fast. Or for example, I have a PowerPoint that is due this week, I gave it to my friend. I wrote everything down that I wanted on the PowerPoint and my friend back home, he is going to do it for me while I focus on other bigger, heavier things. So that support team is good.   But YouTube videos, to answer your questions, they are pretty easy, but PowerPoints, I can do them but because I want certain pictures on the slides, I am going to hand that to one of my assistants.

RESEARCHER: So like inserting the pictures, you will just get one of them to do that for you?

CLAIRE: Yeah (14:26) But all of that other information, he will just copy on there and put the picture on each slide that I want.

RESEARCHER: Do you use or do the colleges, have they provided you any equipment or do you use strictly your own equipment?

CLAIRE: When I first started college, vocational rehab for the blind, they did an evaluation on me and they provided me with things that I needed like a note-taker. They provided me with a note-taker. Back then it was a Braille and Speak but it was a note-taker and they bought it. They purchased a desktop for me and like if something needed maintenance they would get that fixed. But once I was out of there I had to purchase everything. Once they purchased the desktop, they gave it to me at (College E) and I used it along the way. But once I got to (College B) I purchased my own laptop because they had already purchased a computer but I wanted something that was portable so I purchased my own laptop.

RESEARCHER: (15:45) What about like in setting up your computer or your laptop initially, who helped you get all of that set up?

CLAIRE: Well when I was first in college, voc rehab did, assemble my desktop. Laptop, I purchased all of the software. It is easily accessible so I downloaded all of that onto the computer.

RESEARCHER: What all software do you use?

CLAIRE: JAWS mainly, JAWS and yeah, that is pretty much it.

RESEARCHER: (16:30) How do you communicate your needs to the school or to your professors?

CLAIRE: Well, I do have a quiet side but I am never shy. One of my professors says every week that he comes in I am loaded with questions. So I am a planner, an organizer for the most part so I ask. I ask questions, I email them because I like staying on top to get my money's worth so I ask or email.

RESEARCHER: Do you go through the school's ADA coordinator or do you communicate directly with your professors?

CLAIRE: The only thing I do with the ADA coordinator is at the beginning of each semester we send out letters to my professors telling them my accommodations. And like, if I have problems with anything like when I first started, there is no braille in the building, on the doors. I told them that but other than that, that is the only thing I do. I contact her so she can send a list of accommodations to each of my professors that I am having that semester.

RESEARCHER: Okay, let me ask you this, would you mind sharing any of those emails or correspondence with me if you still have, like what you send them so that I can have as part of my document review collection? Of course, your identifying information would be stripped out of it. In fact, the name of the college and all of that would be stripped out.

CLAIRE: Send you like concerning my needs?

RESEARCHER: Uh huh. Yep.

CLAIRE: Okay, if I can find them I will. (18:23) That is no problem.

RESEARCHER: And if you have any of your course syllabi, that you would be willing to share with me, especially if any of them had any particularly challenging assignments

in there that would be something you would want to share with me to say okay, this is a class that I took that required all of this stuff here, blah, blah, blah. That would be great. I could use that as part of my document review.

CLAIRE: Okay (18:47)

RESEARCHER: What about like online discussions. Do any of your classes have any type of required online discussions?

CLAIRE: No.

RESEARCHER: Okay, as you reflect on your experiences would you go back and change anything that you have done? Would you do anything differently or what would you do differently going forward?

CLAIRE: Is this for all three colleges?

RESEARCHER: Yes. (19:20)

CLAIRE: Okay, I am good with (College D) with what I have done but when I first started at (College E) I was only like a year being blind. I was timid. I was reserved. I would have been more independent. I was not used to using my cane in public and it was embarrassing. And I know that is part of the journey. But I use it, but not enough. So I would have been more independent. At (College B) I would have gotten out and been more social because I was just so gung-ho trying to make sure I didn't have to go back to my hometown and work in the furniture factory. I wanted to get an education. So those are just something I would have changed.

RESEARCHER: (20:30) Okay, we talked a little bit about those who have helped you along the way. Is there anyone else you want to talk about, friends, family, voc rehab?

CLAIRE: There is only one person that I take with me no matter where I go and that is my grandfather. My mom was a single parent and he stepped in and helped her raise her three children. And when I started school my main goal was to go ahead and get my degree so I could help build him a home because he had sacrificed so much for us. But he passed my second year of college. So what he did for us to help us have impeccable character traits, I will never forget. So I always keep him near and dear to my heart and in my mind. That is the only person.

RESEARCHER: Okay. (21:19) It sounds like you have a good support system.

CLAIRE: Yes, I have been blessed. I have a support system that whenever, honestly, when I call them they are coming. And I know a lot of people that are not like that so I do have a great support system.

RESEARCHER: Okay, we've already kind of talked about any issues that you have had with software, but what about any particular issues you have had with hardware that you can think of that want to share?

CLAIRE: (Pause)

RESEARCHER: Like did the computers they gave you, did they work okay?

CLAIRE: Yes, they worked fine. Nothing I can think of at this time.

RESEARCHER: (22:10) Okay, we talked about the textbooks, have they gotten you those on a timely basis?

CLAIRE: That's the thing. When you order, let's say when I order, they have to let me know my textbooks early, what they are. Because when you order anything accessible, oh boy, it is another category. Nothing seems to come fast. So when I first started college, they let me know, (College D), let me know the names of my textbooks and

recommended readings, like hardback books, the same time they let my sighted

classmates know. It was a headache.   It seemed like it took about a month, or months,

for it to come in. So, I forgot the question, but it does take a while.

RESEARCHER: Do they help you with that or are you on your own?

CLAIRE: (23:11) Well, I did contact the ADA coordinator and they just help find where

the books may be. Amazon, or audible, we have to order from there. So I don't even call

anymore, because we know how to do the process now. So I don't call them to help me

find my books.

RESEARCHER: So you are saying, we. We who?

CLAIRE: Well, me mainly, but I work with my brother and he and I will go online to

find where the books are and order them. Yes. But I don't contact them anymore.

RESEARCHER: Okay, what advice would you have for any future college students that

are visually impaired in terms of preparing for the technology-driven demands of college.

CLAIRE: Go and get training at (vocational center name redacted) or wherever they may

choose. Learn all they can. And try to learn more than that. But always learn, no matter

where you are. Learn how to use Excel, Word, how to pretty much dominate the Internet

because it is the way of the world now. Learn how to use refreshable braille, how to use

note-takers, Duxbury, if I didn't say it. I mean, anything you can learn, learn. Also, learn

to advocate for yourself. Try to stay abreast with what is going on with technology,

(24:55) because it is always changing. I mean, what you learned yesterday, it may

change tomorrow. So try to stay up to date on what is going on with technology. Try to

stay abreast with what is going on with iPhones and apps, because a lot of classes, you

are using apps in classes to access materials. But if you don't stay up to date, it is going

to be a problem. And you are going to get behind and it can be a headache, trying to learn things so swiftly.

RESEARCHER: Talk about the apps they used. You said they use apps in class.

CLAIRE: (25:37) Well, like I can't even think of the one that we had to access one day in class. He came in and told us to pull it up. It is no problem with accessing it but if you don't know how that is a problem. But what it was, he put questions on using the app, and we had to go in and select our answers. Or he would have a question and we would have to write out our answers. But we had to access that app. And then there are certain apps we had to use that we are going to use in our proposal phase that will help us classify and categorize our information so that we can stay organizing in our process.

RESEARCHER: So you haven't had any trouble with any of those apps (26:26)

CLAIRE: No, I haven't had any trouble. Thus far, I have not.

RESEARCHER: Okay, my last question (26:40) If you could personally speak to the president of your college on behalf of visually impaired college students, what would you say to them?

CLAIRE: I would first start off by telling them that for the most part my experience there has been good. I would ask them if they could possibly consider, not only at (College D), but like when they go to other colleges, having sensitivity training, concerning individuals who are visually impaired. Being as we are talking about that population.

RESEARCHER: Sensitivity training with students, staff or both? (27:32)

CLAIRE: Across the board, everybody. Because there are a lot of unknowns. If they could just know some basic things. Because what I have encountered is, like my first

semester, my cadre leader, my first semester there in school, he was uncomfortable. His

first semester there he has a blind girl, a blind lady who uses braille and all this (laughs).

But he is comfortable now. He knows now if anyone is gonna get it I am gonna get it. I

am gonna stay abreast. So I would tell him about sensitivity training.

RESEARCHER: Where was that? At (College D)?

CLAIRE: At (College D), uh huh. (28:21) Yeah. I would talk to him about sensitivity

training. I would talk to him about talking to his staff, faculty and staff about the

importance of working with the ADA coordinator and the office about making sure that

they remember the term "accessibility" because some things, well, they need to try it too.

They need to get out there and see what we do, because they have no idea. And they

need to work with us. People can show them. They would probably be more than

willing to show them how things work so they can have an idea. About the term

"accessible". About the importance of having braille, because they still don't have braille

where I am. I am so used to it, and where to go but that is very important. That's about

it. And about tolerance. It starts at the head but you know.

RESEARCHER: What do you mean about the tolerance? (29:39)

CLAIRE: Well, that is a trait you are taught along the way though. That no matter what,

everyone isn't going to be the same. And I just say tolerance because some people have

gotten uncomfortable around me because I am blind but that doesn't mean that I am

different from you it is just that I don't see the same as you but we are all humans. So at

this time, I think that is all I would talk to him about that I can think of. (30:13)

RESEARCHER: Okay, let me ask you this. Let's go back about when you were at

(College E) and (College B). Did you live on campus?

CLAIRE: Oh yeah.

RESEARCHER: Did you have a roommate?

CLAIRE: Oh, no. Never.

RESEARCHER: Was that your personal choice or did they make you feel like you needed a room by yourself?

CLAIRE: No from a child, I ain't never liked living with people like that. So I lived by myself by choice. I lived in the dorm at (College E) and in the dorm at (College B) I stayed in the dorm and later moved into my own on-campus apartment.

RESEARCHER: Okay, let me ask you another question, you were talking about you would recommend some sort of training with their staff and students. This may kind of be off-subject but it is something that I recently saw in an article and actually one of the other people I interviewed this subject came up. (Redacted info) will blindfold staff members, as part of their professional development training especially the new staff members, so that they can understand how you have to rely on the other senses, etc. Recently I saw an article that was written by someone who is blind that said stop doing that. They thought that it was insensitive, and that was not a good way to do a professional development because it taught people to fear being blind. But that is kind of how we have always done that professional development so that people can understand what your world is like, so do you agree or disagree with that?

CLAIRE: I think that is just their opinion. (32:21) And I don't think that it teaches fear, on my behalf. I think that it lets them walk a few moments in someone else's shoes. And the great thing about it is they are going to return to normal, quote unquote normal.

RESEARCHER: Like they can take their blindfolds off.

CLAIRE: Right, like go back to their life. But I don't look at it as fear (32:45). I look at it as giving them a few moments to walk in their shoes, for a few moments. Nah, its just giving them a real life experience in it. So I disagree with them. I would welcome a debate on that one.

RESEARCHER: I am glad to hear you say that because it really made me stop and think, am I being insensitive? Okay, is there anything else you would want me to know. Or any particular incidences that come to your mind that you would want to share?

CLAIRE: No, not at all. I just appreciate the opportunity honestly because I can share and help out the cause I mean it is all beneficial. So I don't have anything else to share.

RESEARCHER: Okay, one other thing I thought of (33:43) Talk to me a minute about PDF documents, have they given you any type of PDF documents that have just not been accessible for you?

CLAIRE: Naw, that right there has pretty much been mastered concerning those documents. There are some applications and forms that we are still working on. We, being other professionals in the field, concerning mastering them, where whenever we have to complete an application or form we can. Now sometimes when it gets to an application that is merky, we have to bring in a set of eyes for it or someone to tell us what is going on. But concerning college, at (College D), no, they pretty much just send the syllabus on a PDF at times but it is fine. It is easy to access, as long as I keep updating Adobe and make sure I have all of that on there it is good. It is pretty much the modern form of doing things now.

RESEARCHER: Okay, that is it.

CLAIRE: It has been my pleasure.

RESEARCHER: I am going to turn the recorder off.

CLAIRE: Thank you mam.

(End of recording)

APPENDIX G

TRANSCRIBED INTERVIEW WITH "DENISE"

Transcribed Interview

"Denise"

Note: Before recording began informed consent was explained and signed. It was explained how the interview would be recorded and transcribed. Numbers in parenthesis represent the time stamp of the recording. Wording is presented just as was stated. Sentences may be incomplete or contain slang words or phrases but are the actual words used in the conversation. Identifying information such as school names and names of individuals have been redacted to ensure anonymity and confidentiality. The recorder's battery died during the interview with Denise. The transcription below contains the portion of the interview that was captured on the recorder.

(Begin recording)

RESEARCHER: As a college student myself I am aware of the reliance on technology, specifically computers and access to the Internet to access course content and course requirements as well as the submission of assignments. The purpose of this study is to capture the experiences of college students who are blind or visually impaired with digital classrooms. I am curious to know about your experiences, your thoughts, your attitudes and beliefs about digital classrooms. But before your begins sharing about your personal journey through the technology of higher education would you mind sharing a little bit about yourself first such as your age, your eye condition, how long you have been in college, your college major, that type thing.

DENISE: My name is (name redacted), I am (exact age redacted) years old. I have this condition called pseudo-tumor cerebri. It is a form of papilledema. I have been dealing with this condition for 6 years, um, yes, 6 years. What else?

RESEARCHER: Where are you in school?

DENISE: As of now I am a junior.

RESEARCHER: Junior?

DENISE: Yes, I am classified as a junior, a junior mass communications major and a theatre minor. As far as the digital classroom experience (1:33) it is kind of difficult because it is hard in the sense that it is hard to enhance your work. Or the technology isn't updated to where you can actually be able to enhance it to where you can see it better or work with it better. A lot of teachers don't know how to use the online portions of getting you classwork and stuff like that so it is really tough in a sense.

RESEARCHER: Okay, when you say the technology isn't updated, do you mean the school's technology?

DENISE: Yeah.

RESEARCHER: Tell me what you mean.

DENISE: Like we have this system called Blackboard but now teachers are using other systems too like TopHat.

RESEARCHER: TopHat? I haven't heard of that one. Tell me about it.

DENISE: It is like um, teachers can put the chapters and the assignments online (2:35) and you can go on there and complete the work. It is like a virtual classroom in a sense. But because it is so new it is not updated enough because if you try, you know like to enhance the magnification of it, the like, what should I say, the uh, content enlarges but it

is still hard to maneuver through it because everything else enlarges too like the outer layer of the work, like the titles and stuff like that so it makes everything else hard to see. So you have to do one thing, like have it on your iPad, like screen shot it on your iPad then go back and read it on your computer as well.

RESEARCHER: So you are screen-shotting it then magnifying it on your own?

DENISE: Like I screen shot it on my iPad to read (3:29) and then go in and put the answers in, I screen shot everything then go in and put the answers online. So I have the computer in front of me and the iPad beside me just to maneuver the TopHat.

RESEARCHER: Wow. Okay, so what about Blackboard? (4:02) Tell me about your experiences with that.

DENISE: Well, with Blackboard, uh, well it was kinda easy to use, except for when you have online classes, and you have to submit your verification that you are in the class and then like constantly uh, some assignments don't pull up. And then you will probably have a problem with dates. Your work might say one date and the teacher has another day so it is confusing.

RESEARCHER: What technology do you use, what have you found works? What do you like to use personally? And what have you found that just doesn't work that you just don't want to use?

DENISE: I use, in my room, because I really don't carry anything to class with me but my phone. I use a magnifier on my phone I use with me in class. (5:07) I had a, what was it called? I had a Ruby at first.

RESEARCHER: A Ruby?

DENISE: Uh huh, it is a hand-held magnifier. I had that at first, then I was supposed to

be getting another Ruby but I ended up getting, what is it called, I think it was called a

diamond or something, I don't know. It was some name. I don't know what it was called

but it was worse than the Ruby because it was so loud. It made too much noise though.

But in my room I have a CCTV that I use on a day to day basis (5:47).

RESEARCHER: Is it something that the school supplies or you brought it yourself?

DENISE: No, um, vocational rehab.

RESEARCHER: Voc rehab?

DENISE: Uh huh. The school doesn't have any assistive technology, any.

RESEARCHER: So talk to me a little bit about that. When you first came here, tell me

about your conversations with disability support services, who have you reached out to,

have they been helpful, not helpful, tell me about that.

DENISE: (6:23) Um, when I first got here, this lady named (name redacted) was over

disability services, and when she was there if there was anything that I needed she was

able to help me get like as far as my classes go, talking to my teachers, getting work

done, stuff like that. She was supportive in a sense but she didn't really do everything for

you because she wanted you to advocate for yourself. So it was like if you have a

problem in class you had to tell the teacher yourself. But if it was a repetitive problem

she would stop it.

RESEARCHER: You said when you needed help getting what you needed – like what?

DENISE: Like I had a problem with my vocational rehab because she, I needed a new

Ruby, the Ruby I had, the screen had cracked or something like that, it had stopped

working, but I needed a new Ruby and she wouldn't get me another one because she was

saying her boss wouldn't let her get another one because I had just got one. And then I

needed another CCTV because that one I had was so big, and it was too heavy to carry around to class. Even though I had a case where I could roll it around to class and stuff, it was too much because I have to, uh…

RESEARCHER: It was big and bulky? (8:01)

DENISE: Yeah, it was too much to do so they wouldn't order me another one because I had just gotten one like two years ago, but that was wrong because I had gotten it like in 2010.

RESEARCHER: You said you were a junior here, is this the only school you have been to?

DENISE: No, I went to (College B) for a year and a half.

RESEARCHER: One of the things I explained in the email and in the letter that you signed is that this research is not necessarily an evaluation of the school, so the school names are not going to be in the report at all, but talk to me about how this school compared to (College B) in terms of meeting your needs and the technology part.

DENISE: Okay, at (College B), with disability services, they met my needs. They had uh, when it came down to taking my tests, they had like um, like a room, that was set off for students to go in and take their tests, but they had CCTVs (9:26).

(Note: The recording stopped due to battery failure at this point of the interview. The remainder of the interview was captured through notes that were reviewed and verified by the applicant.)

VITA

VITA

Jo Ann Malone
Flora, Mississippi

Education
        M. Ed., Special Education, University of Southern Mississippi, 2005
        B. S., Business Administration, Belhaven University, 1999

Work History
        2017 – Present
        Executive Director, Office of Accreditation
        MS Department of Education
        Jackson, MS

        2014 – 2017
        Superintendent, Mississippi School for the Blind
        Jackson, MS

        2012 – 2014
        Education Bureau Director II – Director of Accountability Systems
        MS Department of Education – Office of Accreditation & Accountability
        Jackson, MS

        2011 – 2012
        Division Director II – Director of Special Populations Testing
        MS Department of Education – Office of Student Assessment
        Jackson, MS

        2006 – 2011
        Division Director II – NAEP State Coordinator & Blue Ribbon Schools
        Coordinator
        MS Department of Education – Office of Student Assessment
        Jackson, MS

        2001 – 2006
        Teacher
        Mississippi School for the Blind
        Jackson, MS

Professional Activities
- Member, MDE Accountability Task Force (2015-2016)
- Graduate, MS Community College Leadership Academy (2015-2016)
- Member, PARCC Research and Psychometric Operational Working Group (2013)

- Member, PARCC Accessibility, Accommodations, and Fairness Operational Working Group (2014-2015)
- Advisory Board Member, Mississippi Library Commission's Blind and Physically Handicapped Services (2013-2014)
- Member, MDE Braille Bill Advisory Committee (2012-present)
- Advisory Board Member, Mississippi Vision-Hearing Project (formerly known as Mississippi Deaf-Blind Project) (2007-present)
- National Helen Keller Fellow – A project of the Teaching Research Institute (2008-2009)
- Member of ETS National Advisory Committee, Teachers of Students with Visual Impairments PRAXIS Exam (2007-2011)
- Member, ETS Standing Committee, Teachers of Students with Visual Impairments PRAXIS Exam (2007-2012)
- Member, ETS Standard Setting Committee for the Braille Praxis/Competency Exam for Mississippi (2010)
- Member, ETS Standard Setting Committee for the Praxis Exam for Teachers of Students with Visual Impairments for Mississippi (2005)
- Member/MDE Representative for Council of Chief State School Officers State Collaborative on Assessment and Student Standards' committee on Assessing Special Education Students (2008, 2011)
- Member/MDE Representative, Council of Chief State School Officers State Collaborative on Technical Issues in Large-Scale Assessments (2012-2014)
- Member, Dynamic Learning Maps Consortia Governing Board (2011-2012)
- Co-chair, NAEP State Coordinators' Special Interest Group on Inclusion of Special Education & ELL Students (2008-2011)
- Fellowship - USDE Institute of Educational Sciences/National Center for Education Statistics (2009)