INCLUSIVE INSTRUCTIONAL MATERIALS: A NARRATIVE STUDY EXAMINING THE CURRENT WEB-BASED LEARNING CONTENTS (WBLC) AND ONLINE LEARNING ENVIRONMENTS IN HIGHER EDUCATION.

A thesis presented

by

Jack Nguyen

to

The Graduate School of Education

In partial fulfillment of the requirements for the degree of

Doctor of Education

in the field of

Education

College of Professional Studies, Northeastern University
Boston, Massachusetts
December 2015
Abstract

While the advancement of web-based technologies increases the availability of instructional materials to many more non-disability learners, it further isolates the population of learners with disabilities who rely on assistive technologies to overcome inaccessible web-based learning contents (WBLC). At the same time, the effort to create and provide an inclusive learning environment to learners with disabilities is often misinterpreted merely as the utilizations of campuses’ disability services and accommodations. This investigation focuses on accentuating the issues in which giving consideration to the accessibility of WBLC within higher education settings remains habitually an afterthought. Findings and possible implications will contribute to the development and transformation toward inclusive, accessible, and flexible curriculum design models and practices from the ground up.

Keywords: inclusive instruction, Universal Design for Learning, online learning accessibility, narrative inquiry, educational technology
Acknowledgements

I would like to thank the faculty and staff members of the Graduate School of Education, College of Professional Studies at Northeastern University for their patience, support, and expertise throughout this journey.

My fellow Huskies, you gave me strength to get through those long days and late nights. To my family and friends, thank you for your encouragement and understanding. To educators working in the field of special education, I am thankful for the opportunities to work with you and to learn from you.

Special thanks to the participants of this project. I am grateful for your trust in me. Your work ethic, creativity, and extraordinary determination inspire me everyday.
TABLE OF CONTENTS

ABSTRACT ................................................................................................................................................. 2

ACKNOWLEDGMENTS ................................................................................................................................. 3

CHAPTER I – INTRODUCTION .................................................................................................................. 9
  Organization of the Study ............................................................................................................................ 10
  Statement of the Problem ............................................................................................................................ 11
  Significant of the Problem .......................................................................................................................... 13
  Purpose of the Study ................................................................................................................................. 16
  Research Questions ..................................................................................................................................... 17
  Theoretical Framework .............................................................................................................................. 17
  Researcher’s Narrative on Problem of Practice ......................................................................................... 19
    Online learning environment .................................................................................................................... 19
    Inaccessible WBLC ................................................................................................................................. 20
    Humanizing technology ............................................................................................................................ 21
  Addressing Bias and Positionality .............................................................................................................. 22
  Summary .................................................................................................................................................... 25
  Definition of Key Terms ............................................................................................................................ 25

CHAPTER II – LITERATURE REVIEW ........................................................................................................ 27
  Online Education: A Growing Trend ........................................................................................................ 27
  Students with Disabilities and Online Learning ....................................................................................... 30
  Accessibility of the Web and Online Learning Environment .................................................................... 32
  Accessible WBLC: The Roles of Faculty and Institution ........................................................................ 34
  Existing Measures to Support Students with Disabilities ......................................................................... 36
Universal Design for Learning ................................................................. 41
Content Development of Accessible Learning Objects ........................... 44
WCAG 2.0 .................................................................................................. 45
Summary .................................................................................................... 48

CHAPTER III – RESEARCH DESIGN .......................................................... 50
Research Questions and Introduction ..................................................... 50
Paradigm and Interpretive Framework .................................................... 52
Analysis of Narratives ........................................................................... 54
Research Site and Participants ................................................................. 56
Recruitment and Consent Process ............................................................ 56
Confidentiality ........................................................................................ 57
Risk and Safeguard ................................................................................ 58
Data Collection ........................................................................................ 58
Data Storage ............................................................................................ 59
Data Analysis ........................................................................................... 59
Coding Methods ...................................................................................... 60
Research Trustworthiness Using Triangulation ....................................... 61

CHAPTER IV – NARRATIVES ................................................................. 63
Mario’s Story ........................................................................................... 64
Disability ................................................................................................. 64
Alternate Media ....................................................................................... 65
Assistive Technology ............................................................................. 66
Additional Academic Accommodations ................................................. 67
<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interaction with Faculty Members</td>
<td>67</td>
</tr>
<tr>
<td>Navigating Online Learning Environments</td>
<td>68</td>
</tr>
<tr>
<td>Accessing Online Course Materials</td>
<td>70</td>
</tr>
<tr>
<td>Final Thoughts</td>
<td>71</td>
</tr>
<tr>
<td>Hannah’s Story</td>
<td>71</td>
</tr>
<tr>
<td>Disability</td>
<td>72</td>
</tr>
<tr>
<td>Alternate Media</td>
<td>72</td>
</tr>
<tr>
<td>Assistive Technology</td>
<td>73</td>
</tr>
<tr>
<td>Additional Academic Accommodations</td>
<td>74</td>
</tr>
<tr>
<td>Interaction with Faculty Members</td>
<td>75</td>
</tr>
<tr>
<td>Navigating Online Learning Environments</td>
<td>76</td>
</tr>
<tr>
<td>Accessing Online Course Materials</td>
<td>78</td>
</tr>
<tr>
<td>Final Thoughts</td>
<td>79</td>
</tr>
<tr>
<td>Ella’s Story</td>
<td>80</td>
</tr>
<tr>
<td>Disability</td>
<td>80</td>
</tr>
<tr>
<td>Alternate Media</td>
<td>81</td>
</tr>
<tr>
<td>Assistive Technology</td>
<td>82</td>
</tr>
<tr>
<td>Additional Academic Accommodations</td>
<td>84</td>
</tr>
<tr>
<td>Interaction with Faculty Members</td>
<td>86</td>
</tr>
<tr>
<td>Navigating Online Learning Environments</td>
<td>87</td>
</tr>
<tr>
<td>Accessing Online Course Materials</td>
<td>88</td>
</tr>
<tr>
<td>Final Thoughts</td>
<td>90</td>
</tr>
<tr>
<td>Sophie’s Story</td>
<td>92</td>
</tr>
<tr>
<td>Section</td>
<td>Page</td>
</tr>
<tr>
<td>-----------------------------------------------------------</td>
<td>------</td>
</tr>
<tr>
<td>Disability</td>
<td>92</td>
</tr>
<tr>
<td>Alternate Media</td>
<td>93</td>
</tr>
<tr>
<td>Assistive Technology</td>
<td>95</td>
</tr>
<tr>
<td>Additional Academic Accommodations</td>
<td>97</td>
</tr>
<tr>
<td>Interaction with Faculty Members</td>
<td>98</td>
</tr>
<tr>
<td>Navigating Online Learning Environments</td>
<td>99</td>
</tr>
<tr>
<td>Accessing Online Course Materials</td>
<td>102</td>
</tr>
<tr>
<td>Final Thoughts</td>
<td>103</td>
</tr>
<tr>
<td>Ryan’s Story</td>
<td>105</td>
</tr>
<tr>
<td>Disability</td>
<td>105</td>
</tr>
<tr>
<td>Alternate Media</td>
<td>106</td>
</tr>
<tr>
<td>Assistive Technology</td>
<td>107</td>
</tr>
<tr>
<td>Additional Academic Accommodations</td>
<td>108</td>
</tr>
<tr>
<td>Interaction with Faculty Members</td>
<td>109</td>
</tr>
<tr>
<td>Navigating Online Learning Environments</td>
<td>111</td>
</tr>
<tr>
<td>Accessing Online Course Materials</td>
<td>112</td>
</tr>
<tr>
<td>Final Thoughts</td>
<td>113</td>
</tr>
<tr>
<td>Summary</td>
<td>115</td>
</tr>
<tr>
<td>CHAPTER V – DISCUSSION AND CONCLUSION</td>
<td>117</td>
</tr>
<tr>
<td>Discussion</td>
<td>118</td>
</tr>
<tr>
<td>Online Learning Environments</td>
<td>119</td>
</tr>
<tr>
<td>WBLC</td>
<td>121</td>
</tr>
<tr>
<td>Limitations</td>
<td>122</td>
</tr>
</tbody>
</table>
Conclusion and Recommendations ................................................................. 123

APPENDICES .............................................................................................................. 125

Appendix A – Transcriber Confidentiality Statement in a Research Study .................. 125
Appendix B – Call for Participants ............................................................................. 127
Appendix C – Consent Form ....................................................................................... 128
Appendix D – Intake Call and Interview Protocol ...................................................... 130
Appendix E – Notification of IRB Action ................................................................... 138
Appendix F – National Institutes of Health (NIH) Certificate ................................... 139
REFERENCES ............................................................................................................. 140
CHAPTER I: INTRODUCTION

Since the early 2000s postsecondary institutions have been witnessing an increase in online enrollments at an astonishing rate much higher than the on-campus counterparts (Allen & Seaman, 2008, 2009, 2010, 2011, 2012, 2013, 2014; Coy, Marino & Serianni, 2014; Roberts, Crittenden, L. & Crittenden, J. 2011). Online learning has become an increasingly important strategic asset of colleges and universities across the nation in the effort to meet the growing educational demand (Bradbard, Peters, & Caneva, 2010; Fuller, Gillan, & McBride, 2003; McCarthy & Samors, 2009; Pearson & Koppi, 2003; Raue & Lewis, 2011). Evidently, the adoption of web-based technologies is intended to increase efficiency, reduce cost and to accommodate an “increasingly knowledge-based society” (Wang & Shen, 2012). As a result, the number of online courses and programs available has drastically increased every year (Allen & Seaman, 2008, 2009, 2010, 2011, 2012, 2013, 2014; Coy et al. 2014; Roberts et al, 2011; Roh, 2004). In addition, data from recent studies indicates, “students with disabilities increasingly choose to participate in online courses at higher rates than other student populations” (Coy, Marino & Serianni, 2014, p. 63).

Disappointingly, the issues pertaining to inaccessible web-based learning contents (WBLC) remain in existence alongside the evolvement of online learning in higher educational systems (Harper & DeWaters, 2008, de Macedo & Ulbricht, 2012, Hill, 2013). Indeed, common learning management systems (LMS) such as Moodle and Blackboard as well as a large amount of learning contents on the Web possess rather limited ability to be fully accessible to all learners including postsecondary students with disabilities (Foley & Ferri, 2012; Gorski, 2009). In other words, without accessibility measures, web-based technologies and the methods of implementation within higher education online learning environments continue to present
“pervasive digital inequities” to learners with disabilities who rely on assistive technologies to access Web-based learning contents and thus actually diminishing accessibility (Gorski, 2009, p. 350). This notion also reiterated the fact that ensuring the accessibility of many web-based technologies we employed to host, organize, and deliver contents within online learning environments remain an afterthought. In order to develop and maintain an inclusive online learning environment for all learners, it is imperative that higher education institutions address, evaluate, and resolve the issues pertaining to inaccessible WBLC (Roh, 2004; Gorski, 2009).

Organization of the Study

This qualitative narrative study is organized and presented in five chapters. The first chapter introduces the background of the study by providing details such as statement of the problem and its degree of significance, research questions, the purposes of the study and an overview of the theoretical framework. In addition, Chapter 1 provides the researcher’s narrative regarding specific aspects of the problem of practice and describes the biases as well as positionality of the researcher in the role of a practitioner conducting research. Chapter 2 presents a review of literature focusing on the discourses pertaining to accessibility of online learning environments in higher education. In this chapter, the researcher highlights some examples of past and current issues, practices, and implementations exhibited within existing literature. This chapter underlines the importance of filling the gap in literature by a continuing effort to improve the online learning environment as well as the need for user-centered design, practice, and research studies. In Chapter 3, the researcher presents a comprehensive review of research design with the emphasis on the topological relationship between components of the research methodology such as paradigm, interpretative framework, sampling strategy, and data collection and analysis. Chapter 4 of this study presents the collected data in form of narrative
themes that respond to the research questions and structured by the selected tenets of Universal Design for Learning (UDL) and Web Contents Accessibility Guidelines (WCAG 2.0) as presented in the review of literature seen in Chapter 2. In Chapter 5, the final chapter of this study, the findings will be discussed with the emphases on possible implications for current practice and future research.

**Statement of the Problem**

In 1988, the United States Congress first passed the Assistive Technology Act, which was subsequently signed by the President as the Technology-Related Assistance Act of 1988 or commonly referred to as the “Tech Act.” Its main objective is to ensure the availability of assistive technology to all individuals with disabilities of “all ages and in all environments, including in school and at work” (U.S Department of Labor, n.d.). The Act has been reauthorized three times in 1994, 1998, and 2004. In Section 2 of the 2004 amendment, Congress’ findings indicated “over 54,000,000 individuals in the United States have disabilities, with almost half experiencing severe disabilities that affect their ability to see, hear, communicate, reason, walk, or perform other basic life functions” (U.S. Congress, 2004). More importantly, the Act states:

Disability is a natural part of the human experience and in no way diminishes the right of individuals to a) live independently; b) enjoy self-determination and make choices; c) benefit from an education; d) pursue meaningful careers; and e) enjoy full inclusion and integration in the economic, political, social, cultural, and educational main-stream of society in the United States. (29 USC 3001)

At the turn of the twenty-first century, the rapid advancement of web-based technologies and the growing availability of the Internet showcased great potentials for a more inclusive learning environment particularly for students with disabilities at postsecondary institutions in
the United States. Acknowledging the substantial growth of online education and its implementation within higher education environments, as well as the recent enactment of additional assistive technology legislation such as the 2008 Higher Education Opportunity Act (HEOA) and the Americans with Disabilities Act Amendments Act of 2008 (ADAA), researchers, educators, and policy makers increasingly recognize the significance of making WBLC accessible to all learners (Harper & DeWaters, 2008; Hill, 2013; Izzo, 2012; Roberts et al., 2011, p. 242).

However, a survey of recent journals by the Disability Compliance for Higher Education (DHE) and The Chronicle of Higher Education indicates the number of cases has escalated and resulted in costly lawsuits because liable higher education institutions, according to section 504 of the Rehabilitation Act of 1973, failed to provide timely and reasonable accommodations to students with qualified disabilities who struggled with inaccessible WBLC (Burgstahler, Corrigan & McCarter, 2004; Hawke & Jannarone, 2002; Wall & Sarver, 2003).

Additionally, according to Roh (2004), there continue to be evidence indicating the lack of training and support to evaluate and ensure accessibility of WBLC at colleges and universities. In practice, content creators often focus on creating course materials and learning environments for students without disabilities, then simply include an announcement in the course syllabus to direct students with special needs to a disability services department on campus and request for accommodations (Bremer et al., 2002). While this practice may satisfy “reasonable accommodations” as mandated by federal and state regulation, students with disabilities are obligated to invest the extra time and efforts in order to gain access to the same classroom materials as their peers (Fox et al., p. 25; Nganji, Brayshaw & Tompsett, 2013). For instance, a student with a low-vision condition who uses screen reader software to navigate and
read will find it impossible to access files such as course syllabi and lecture outlines given in the form image-based portable document format (PDF). That is to say, the student has been provided with photographs of the texts instead of the actual texts which one could access using text-to-speech or screen reader software as in text-based format files such as accessible PDF, HTML, or Microsoft Word documents. The process to obtain accommodation such as alternate media services to retrofit inaccessible classroom materials requires a significant amount of time. Thus in many cases, students with disabilities often miss out on the opportunities to participate in in-class activities or will have little to no time left to meet the deadlines of their reading, writing, and homework assignments. As a result, the burdens of inaccessible instructional materials tremendously reduce the opportunities for students with disabilities to have fully equal access to education and to become independent learners.

It is commonly understood or assumed that taking online or hybrid courses means learners will have the opportunities to study and to get the course work done on their own pace. While this notion may be true for the majority of students in the same classroom, students with disabilities such as the five participants in this study often find it nearly impossible to accomplish based on their experiences with inaccessible WBLC.

**Significance of the Problem**

Recent survey data from the U.S. Census Bureau’s Population Estimates Program indicates there are approximately 37.6 million people in the U.S. who have one or more disabilities. More importantly, the largest group of individuals with disabilities is made up of approximately 19.6 millions adults between the ages of 18 and 64. Among this age group, many individuals are actively enrolled in programs at postsecondary institutions across the country.
The survey also suggested an increase in the number of people who possess one or more disabilities as the population of our nation ages (U.S. Census Bureau, 2012).

Findings from a large-scale study by the Pew Research Center and *The Chronicle of Higher Education* collecting data from 1,055 presidents of colleges and universities nationwide indicate online learning environments have indeed become an essential component of higher education in the U.S. (Pew, 2011). Similarly, according to U.S. Department of Education’s National Center for Education Statistics, a survey conducted by the Office of Special Education and Rehabilitative Services to collect data from all of the public 2-year and 4-year institutions nationwide reveals 99 percent of small-size (less than 3,000 students) and 100 percent of medium-size (3,000 to 9,999 students) and large-size (10,000 or more students) were enrolling approximately 707,000 students with disabilities at their campuses in the 12-month 2008-09 academic year (Raue & Lewis, 2011).

Nevertheless, educational researchers, computer scientists, and accessibility specialists continue to find a considerable amount of evidence to accentuate the fact that inaccessible WBLC in higher education environments remains a serious issue (Gorski, 2009; Leuthol, Bargas-Avila, & Opwis, 2008). Despite the continuing efforts of federal and state funding sources with the intention to promote inclusivity of online environments, technologies developed for the Web more often than not aim at serving, firstly, users without disabilities. Subsequently, assistive technologies are discussed and considered in forms of retrofits to accommodate each specific type of disabilities. Inaccessible WBLC presents difficulties and a “host of barriers” which prevent learners with disabilities from having equal learning experience (Engleman, 2005; Foley & Ferri, 2012, p. 192; Fox, Hatfield, & Collins 2003; Roberts et al., 2011, p. 243).
Existing literature continues to present evidence that suggests while one in every eleven students at the college undergraduate-level would report having a disability, accessibility is still “not one of the initial concerns” during the process of planning and designing online instruction (Orr & Hammig, 2009). Without sufficient understanding and training to create accessible WBLC, many instructors at postsecondary institutions across the U.S. often find themselves scrambling to find out ways to refer students with disabilities in their class who “needed ‘special’ services to the Office of Disability Services” on campus during the first week or two of the school year (Engleman, 2005, p. 23).

Indeed, because of inaccessible WBLC, some students with disabilities are obligated to take a series of steps that involve additional paperwork to provide evidence of their qualified disabilities in order to obtain assistance from accessibility specialists and disability management advisors to gain access to the online learning environment as well as the content that should have already been designed and created in accessible formats.

Thus, students with disabilities who face inaccessible WBLC, similar to the experiences of the five participants in this study, are more likely having to work much harder and spend a significant amount of additional study hours in order to get through their reading assignments, to research necessary material, to proofread and finalize their writing assignments using assistive technologies. Realistically, students with disabilities oftentimes find themselves to be the last ones in their class to have the same lecture notes or reading assignments as their peers. In other words, the starting point of their journeys toward obtaining higher education begins at a place where there is “no level playing field” for them. In many cases, when the course materials are too difficult or nearly impossible to access even with their existing assistive technologies, students with disabilities are “not even on the field” at all (Jung 2000, 105).
Finally, there is a dire need to recognize the fact that in theory, the implementation of web-based technologies is to present opportunities and support the effort to improve the quality of online learning environments for all learners, whereas in practice, many of its aspects actually further isolate a specific group of students who rely on assistive technologies to accomplish conventional tasks in order to participate in classroom activities. Evidently, an inclusive learning environment has not been a reality to many students in our classrooms across the nation. This notion presents an obvious problem that requires further investigation to resolve (Alversson & Sandberg, 2011; Foley & Ferri, 2012; Seale & Cooper, 2010).

**Purpose of the Study**

The purposes of this study is to a) reveal how college students with disabilities perceive the challenges of inaccessible online contents and; b) suggest feasible strategies to improve online learning experience through addressing the issues pertaining to accessibilities based on Universal Design for Learning (UDL) principles and Web Contents Accessibility Guidelines (WCAG) 2.0. At its core, this narrative qualitative study supports the continuing effort to make online learning environments more inclusive to all learners.

More importantly, this study focuses on the participants’ perspectives as students with disabilities while taking online courses having to face many challenges as the result of inaccessible WBLC. By doing so, this investigation accentuates the problem of practice in which giving consideration to accessibility of WBLC within higher education settings remains habitually an afterthought. Findings and possible implications will contribute to the development and transformation toward inclusive, accessible, and flexible curriculum design models and practices from the ground up. In the process of conducting the research study, the researcher
sought to obtain the theoretical knowledge and analytical skills that ultimately support and inform the day-to-day decision-making process of a practitioner.

**Research Question**

The following questions guided the direction of this study:

*What are the difficulties that college students with disabilities have experienced when they navigate and access online instructional materials?*

- Sub – Question #1: *How do college students with disabilities overcome the difficulties of inaccessible online learning content?*
- Sub – Question #2: *What suggestions do students with disabilities have for instructors, authors, and instructional designers to ensure online learning contents accessible?*
- Sub – Question #3: *How do Universal Design for Learning (UDL) principles and Web Contents Accessibility Guidelines (WCAG) 2.0 help to ensure web-based learning contents (WBLC) accessible to college students with disabilities?*

**Theoretical Framework**

Utilizing narrative inquiry, a fine subset of qualitative research designs, this study aims to investigate and describe online accessibility—an issue in which the discourses, far too often, have become heavily involved in the overly specialized technological aspects of content management systems, social network platforms, web technologies, and hardware rather than the experiences of the end users. Appropriately, by putting emphasis on signifying the voices and lived experiences of the participants, the researcher affirms the application of a “disability interpretive lens” through which disability is recognized “as one dimension of human difference” and thus should be considered widely as the reason for changes toward a more inclusive society (Creswell, 2012, p. 34—38; Mertens, 2003). In fact, Creswell (2012) explicitly lists Critical
Disability Theory (CDT) as an example of a vigorous social justice interpretive framework in a qualitative narrative study that examines the lived experiences of a marginalized group of learners with disabilities. Creswell (2012) describes, in accordance with similar notions indicated in a book published in 2011 by Lincoln et al., how the tenets associate and align with the philosophical assumptions in the following topology:

<table>
<thead>
<tr>
<th>Interpretive Framework</th>
<th>Ontological Beliefs (the nature of reality)</th>
<th>Epistemological Beliefs (how reality is known)</th>
<th>Axiological Beliefs (role of values)</th>
<th>Methodological Beliefs (approach to inquiry)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Critical Disability Theory</td>
<td>Reality is based on power and identity struggles. Privilege or oppression based on race or ethnicity, class, gender, mental abilities, sexual preference.</td>
<td>Reality is known through the study of social structures, freedom and oppression, power, and control. Reality can be changed through research.</td>
<td>Diversity of values is emphasized within the standpoint of various communities.</td>
<td>Start with assumptions of power and identity struggles, document them, and call for action and change.</td>
</tr>
</tbody>
</table>


In addition, recognizing the technological-oriented nature of the investigation, the researcher employs Universal Design for Learning (UDL) guidelines and the key tenets of Web Contents Accessibility Guidelines (WCAG) 2.0 to help inform the construct of the study’s methods. UDL and WCAG 2.0 ensure the relevancy of the research questions, the interview questions, and the structure of the literature review chapter. Finally, the researcher utilizes UDL guidelines as a guiding assessment instrument to systemize the findings of this study in order to suggest possible implications to current practice and future research.
Researcher’s Narrative on Problem of Practice

**Online learning environment.** The Internet and its tremendous potentials for us to teach, to learn, and to share knowledge always fascinates me. When I was growing up, my parents and older sister were already working as career educators. In the early 2000s when it was time for me to select a career path, I decided to become an educational technologist. No one was surprised.

The early 2000s was the period of time in which online and hybrid learning environments began to take shape and before we knew it, universities and colleges around the country were adding online and hybrid courses to their catalogs at the a rate like never before. Today, online learning along with its advantages and shortcomings continue to take part in shaping the landscape of higher education.

Today, many of our daily essential tasks, including those of teaching and learning, are deeply connected via the Internet and take place on Web-based platforms. Thus, it is incredibly common to witness learners and teachers working together in real-time without the need to even physically be in the same continent. In fact, because of online and hybrid courses, we have grown accustomed to a new type of expectation in which a large portion or all of the classroom activities would transpire online from anywhere, at anytime, around the clock and across the globe.

Having permanently changed the way many of us teach and learn, online learning is here to stay whether we choose to accept it or not. For that reason, the focus of the discourse among those who practice in the educational technology field has also shifted toward considering the fact that while we are able to make online learning available to many, we still fail to make it accessible for all. This notion resonates with me very deeply.
Inaccessible WBLC. The reality in which WBLC is not accessible for all learners resonates with me deeply because I continue to witness the gap between the levels of WBLC accessibility for learners without disabilities and learners with disabilities to be as prominent as it was at the beginning of online learning decades ago. Having worked as an accessibility specialist for nearly ten years, I get to enjoy the excitement of witnessing the dynamic of ever-changing Web-based technology in general and educational technology in particular. Similarly, assistive technologies such as software and hardware designed to accommodate students with disabilities in higher education have also been improved over the years. Yet, many of the core features appear to be conceived in forms of tools that help users to retroactively overcome inaccessible digital or web-based contents.

Case in point, each semester my team members and I produce and disseminate tens of thousands of pages of learning contents in alternate formats. Our computer workstations, equipped with a bundle of highly specialized software, would often be running non-stop around the clock converting digital files and scanning textbooks or course readers. The most demanding and time-consuming projects would involve editing and retrofitting image-based digital versions of poorly photocopied and heavily annotated handwritten notes on pages from magazines, textbooks, webpages, and peer-reviewed articles. It is not uncommon for me to receive urgent phone calls and emails from students regarding WBLC that contain incomplete texts and severely illegible areas making it laborious to read even for people with perfect eyesight.

As for students with print-related disabilities including the participants in this study who rely on screen readers such as JAWS, VoiceOver, or NonVisual Desktop Access (NVDA), voice recognition applications such as Dragon NaturallySpeaking or Windows Speech Recognition, it is impossible to access such documents. Retrofitting inaccessible WBLC is a task which involves
multiple stages. For instance, image-based digital documents require extensive adjustment and restructure using optical character recognition (OCR) application such as ABBYY FineReader. While advanced OCR applications are known for working exceptionally well in terms of identifying text characters, graphical elements, and other attributes within digital documents, the key factor, first and foremost, is that the documents themselves must be legible.

That is to say, it is impossible for OCR applications to make severely illegible documents legible, let alone accessible. In dealing with such cases, the production team and I are required to identify and obtain a different source file before we could begin the process by searching for existing digital copy of the same documents or performing scanning process in-house if needed. We repeatedly discover higher resolution and legible versions for many of the WBLC readily available through the university library’s repositories or one its vast connected networks of established sources for academic journals and instructional materials.

Evidently, one of the most common misperceptions among many online content creators and content distributors is to assume that uploading digital versions of or listing direct links to WBLC would constitute accessibility. It is not the case when WBLC is inaccessible. While offering the list of files on Moodle, Blackboard, and similar learning management system (LMS) or on webpages and social media platforms may make it more convenient to retrieve documents, for students with disabilities who rely on assistive technologies to read, write, and conduct research, such practice often unintentionally creates barrier to accessibility.

**Humanizing technology.** While completing my studies in graduate school, I came across the term “humanize technology” and found it incredibly inspiring. As I was receiving extensive training in the areas of interaction design, human-center design and usability for the Web and mobile devices, I was particularly interested in the idea of working to reduce the mystical aspects
that the end users often face as they interact with everyday technologies. Today, end users—especially students who attend colleges and universities—depend on computers, software application, and social networking tools to accomplish both personal tasks as well as school work, and based on my professional experience, many of them continue to find technologies intimidating. After about a decade of working as a professional technologist, I am still amazed how many times a week someone would, right before asking me a computer-related question during a consultation appointment, begin with a sentence such as “I am not ‘computer savvy.’” or “I am technology-illiterate.” My favorite is always the candid “I hate computers.” In other words, many computer-based and web-based educational tools as well as assistive technologies remain puzzling as they severely lack intuitiveness for recurring users who rely largely on such supports in order to accomplish learning tasks.

Among the collective efforts toward providing learners with an inclusive educational experience, I find it critical to recognize the importance of improving the accessibility of online learning environments by understanding the needs of the stakeholders who are most vulnerable and frequently marginalized, such as students with disabilities (Jacobson, Azzam, & Baez, 2013).

**Addressing Bias and Positionality**

As Creswell (2012) describes, because qualitative researchers must, in many ways, “position themselves” in a qualitative research, their backgrounds such as “work experiences, cultural experiences, history” consequently inform the “interpretation of the information in a study” (p. 47). This notion is quite true in this study. There is no doubt that my interest in conducting a curriculum transformation research derived from the day-to-day events that I experienced in my professional life (Machi & McEvoy, 2009). I believe that it takes a
considerable amount of training and years of practice for researchers to keep in check their presumptions toward a problem of practice and the outcomes of a research study. I think it is imperative that I carefully detail my own biases and positionality as a researcher.

Aside from my duties at the office, I am a researcher who invests effort into learning and finding a better solution to improve accessibility in higher education. As a researcher, I believe that I may lean toward a certain approach rather than others because of the work-related practical knowledge I have earned during my career up to this point. In addition, there is always a probability in which my position as a researcher could be seen as being “the other” to both the participants and target audience of the study that collects data and analyzes issues within a system such as online learning courses that have been in service for a number of years (Briscoe, 2005). Thus, to ensure my decision-making process is as informed as possible, I must rely on skills and knowledge acquired through both research and practice (Jenlink, 2003). As Palmer (1998) explains, educational scholars serving as effective change agents are those who choose to “remain passionate learners.” Additionally, it is important that scholar-practitioners seek and thrive on the opportunities “for self-renewal” (Herbert, 2010, p. 33).

By assuming the official role of the accessibility specialist at a public 4-year university, I am an active practitioner in the field of educational technology. A portion of my duties include providing consultations to members of the university on best practices and support the effort toward improving teaching and learning experiences through enhancing accessibility of online learning contents to all learners with and without disabilities. As a doctoral candidate and an emerging researcher, I repeatedly find in my daily practice, an available body of facts that indicate many aspects of our online education requires further refinement.
For instance, my professional experiences inform my decision on selecting and refining not only research tradition and methodology, but also the participants whom I interviewed to collect data. Jupp and Slattery’s (2006) notion on positionalities also serves as a reminder of who I am toward the specific group or groups of individuals that I may come to contact during my research. Examples of biased perspective described by Parsons (2008) resonated with me and reminded me of potential partiality in my current and future studies. I realized the importance of the language I may use while describing specific technical-related terms and the need to avoid, at all cost, making the audience and research participants feel uncomfortable because they are not yet familiar with the latest technology or still struggle with utilizing mainstream and popular ones. In my experience, excessive usage of “techie lingos”—the highly specialized technology-related terminologies by researchers and presenters—results in marginalizing the audience and participants of all ages, genders, ethnicities and abilities.

Furthermore, being a teenager in the 1990s, I grew up with the Internet. Later, I received training in computer science, programming languages, and user-centered design. In my private life, I have more interactions with individuals who share similar perceptions and backgrounds on technologies. As an educator and a technologist, I serve individuals from all age groups with all levels of technological backgrounds and trainings. On occasions, the generation-related differences toward certain technological trends, usages or preferences also need to be part of my consideration. In regard to the ethical responsibility of a researcher, as my position and the nature of my profession allow me the access to confidential as well as other sensitive and personal information of others, I must clearly define the boundary of what and how much I could or could not disclose while conducting research.
Recognizing these notions is a helpful step for me during the process in which I considered the selections of theoretical framework and appropriate research methods to effectively gather accurate and efficient information, personas and case scenarios to construct participant’s narratives. Moving forward, such realizations will continue to inform my actions in the future.

**Summary**

The overarching goal of this investigation was to accentuate the issues in which giving consideration to the accessibility of WBLC within higher education settings remains habitually an afterthought. Using narrative inquiry, the researcher sought to present the voices of five participants who shared their lived experiences as students with disabilities facing challenges, in one form or another, each time they are enrolled in the courses that utilize Web-based components to store, deliver, and retrieve classroom materials. Stories and story-telling not only help capture the details of participant’s experiences effectively but also contribute, in a people-first convention, towards the discourses pertaining to accessibility within online learning environments. Findings and possible implications will contribute to the development and transformation toward inclusive, accessible, and flexible curriculum design models and practices from the ground up.

**Definition of Key Terms**

A selection of terminologies frequently used throughout this study and their definitions.

- Alternate media: Formats such as accessible digital files, Braille, tactile graphics created as the alternatives to printed classroom materials including textbooks, course syllabi, and other related publications in order to provide equal access to students with qualified print-related disabilities.
• Assistive technology: Equipment, software, and hardware designed to support, sustain, and enhance functional capabilities of individuals with disabilities.

• Hybrid (blended) course: A combination of face-to-face and online interactions between instructors and learners. Course content delivery methods and classroom activities are facilitated via learning management system (LMS), content management system (CMS), or other web-based environments such as websites and social media platforms.

• Online course: There is no face-to-face interaction between instructor and learners. Course content delivery methods and classroom activities are facilitated online.

• Section 508: Refers to a statutory section in the Rehabilitation Act of 1973 (refer to 29 U.S.C. 794d). Its primary purpose is to provide access to and use of Federal executive agencies’ electronic and information technology (EIT) by individuals with disabilities. Detailed statutory language can be found at: www.section508.gov.

• Universal Design for Learning (UDL): A set of guidelines to create an inclusive learning environment in which all learners have equal access to learning contents and the opportunities to participate in classroom activities.

• Web-based learning contents (WBLC): Instructional materials stored and made available online for instructors and learners to access via the Internet.

• Web content accessibility guidelines (WCAG and WCAG 2.0): A detailed set of guidelines by the World Wide Web Consortium (W3C) to help designers and developers make online contents accessible to all users with or without disabilities.

• Web facilitated course: Course that uses web-based technology to facilitate what is essentially a face-to-face course. Instructors often use a course management system (CMS) or web pages to post the syllabus and assignments.
CHAPTER II: LITERATURE REVIEW

This review of literature reiterates the fact that Web-based technologies, digital media, and the Internet play an important role in assisting post-secondary students with disabilities to actively and independently participate in the learning activities within online environments (Jaeger, 2006; Orr & Hammig, 2009; Wald, Draffan, & Seale, 2009). It is also evident that while online learning environments open up a wide range of education and career advancements, existing literature continues to present evidence that some students with disabilities still find it difficult or impossible to fully access WBLC (Burgstahler, 2002; Gorski, 2009). Several sections of this literature review may appear to consist of technical tenets, guidelines, and statistical-driven contents. It is because of the nature of the contents being reviewed and the languages frequently used within such discourses. In addition, my intention is to exhibit a cross section of the degree to which vigorous studies have been conducted and discussed regarding the significance of accessibility in online learning, UDL, and WCAG 2.0.

Scholarly works gathered specifically for this review of literature aim to highlight: a) the growing demand for and popularity of online learning, particularly among students with disabilities; b) the common issues pertaining to accessibility; c) the practicalities and complexities of implementing UDL and WCAG 2.0 in the effort to improve accessibility; and d) the importance of designing and developing accessible online learning from the ground up.

**Online Education: A Growing Trend**

Online education has been a remarkable growing trend over the past two decades (Pearson & Koppi, 2003; Robert et al., 2011). In 2011, data from the annual report titled “Going the Distance: Online Education in the United States, 2011” (formerly known as the Sloan Online Survey series) by the Babson Survey Research Group confirmed, once again, that
“online education is critical” to the long-term strategy of the higher education system (Allen & Seaman, 2011). As illustrated in Figure 1, the majority of Chief Academic Officers (CAOs) from over 2,500 colleges and universities who participated in the survey have been increasingly agreeing with this notion. The researchers explicate,

The percentage of institutions that agree “Online education is critical to the long-term strategy of my institution” reached its highest level in 2011 (65.5%). The percent disagreeing has held steady at just over ten percent for all nine years of the survey.

(Allen & Seaman, 2011, p. 8)

Furthermore, it is also important to note that the survey series have “consistently found that most chief academic officers rate the learning outcomes for online education ‘as good as or better’ than those face-to-face instruction.” In 2003, fifty-seven percent of CAOs agreed with this comment and in 2011, the figure was sixty-seven percent (Allen & Seaman, 2011, p. 5).

Since 2002, the number of CAOs who believe Online Education is critical to the long-term strategy of their institution has shown:

![Bar chart showing the increase in agreement and steady disagreement from 2002 to 2011.]


**Figure 1. Online Education Critical to Long-Term Institution Strategy**

In other words, the involvement of online learning environments within higher education has long passed the point of no return (Bradbard, Peters, & Caneva, 2010; Fuller, Gillan, & McBride, 2003; Raue & Lewis, 2011). According to the report, since 2002, “online enrollments
have been growing substantially faster than overall higher education enrollments” and “continues to be far in excess of the rate for the total higher education student population” (see Table 1).

Based on the responses from participating campuses, there were more than 6.1 million students reportedly taking at least one online course in Fall 2010, resulted from an increase of 560,000 students (10.1%) in comparison with the previous year (p. 4). As Allen & Seaman (2011) reported, between Fall 2002 and Fall 2010, the growth from 1.6 million to 6.1 million students taking one or more online courses “translates into a compound annual growth rate of 18.3 percent” while the total higher education student population has grown at “an annual rate of just over 2 percent” during the same period (p. 11).

Table 1
Total and online enrollment in degree-granting postsecondary institutions—Fall 2002 through Fall 2010

<table>
<thead>
<tr>
<th>Year</th>
<th>Total Enrollment</th>
<th>Annual Growth Rate Total Enrollment</th>
<th>Students Taking at Least One Online Course</th>
<th>Online Enrollment Increase over Previous Year</th>
<th>Annual Growth Rate Online Enrollment</th>
<th>Online Enrollment as a Percent of Total Enrollment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall 2002</td>
<td>16,611,710</td>
<td>NA</td>
<td>1,602,970</td>
<td>NA</td>
<td>NA</td>
<td>9.6%</td>
</tr>
<tr>
<td>Fall 2003</td>
<td>16,911,481</td>
<td>1.8%</td>
<td>1,971,397</td>
<td>368,427</td>
<td>23.0%</td>
<td>11.7%</td>
</tr>
<tr>
<td>Fall 2004</td>
<td>17,272,043</td>
<td>2.1%</td>
<td>2,329,783</td>
<td>358,386</td>
<td>18.2%</td>
<td>13.5%</td>
</tr>
<tr>
<td>Fall 2005</td>
<td>17,487,481</td>
<td>1.2%</td>
<td>3,180,050</td>
<td>850,267</td>
<td>36.5%</td>
<td>18.2%</td>
</tr>
<tr>
<td>Fall 2006</td>
<td>17,758,872</td>
<td>1.6%</td>
<td>3,488,381</td>
<td>308,331</td>
<td>9.7%</td>
<td>19.6%</td>
</tr>
<tr>
<td>Fall 2007</td>
<td>18,248,133</td>
<td>2.8%</td>
<td>3,938,111</td>
<td>449,730</td>
<td>12.9%</td>
<td>21.6%</td>
</tr>
<tr>
<td>Fall 2008</td>
<td>19,102,811</td>
<td>4.7%</td>
<td>4,606,353</td>
<td>668,242</td>
<td>16.9%</td>
<td>24.1%</td>
</tr>
<tr>
<td>Fall 2009</td>
<td>19,524,750</td>
<td>2.2%</td>
<td>5,579,022</td>
<td>972,669</td>
<td>21.1%</td>
<td>28.6%</td>
</tr>
<tr>
<td>Fall 2010</td>
<td>19,641,140</td>
<td>0.6%</td>
<td>6,142,280</td>
<td>563,258</td>
<td>10.1%</td>
<td>31.3%</td>
</tr>
</tbody>
</table>


Certainly, online education has been an essential part of teaching practice and learning
experience at colleges and universities across the nation. For instance, when the Association of Public and Land-Grant Universities (APLU) and the Online Commission conducted surveys with the Tribal College and University (TCU) presidents as well as the presidents and chancellors of National Association for Educational Opportunity (NAFEO) member-institutions asking them to voice their opinions “toward online learning as a strategic asset to achieve broad institutional goals and priorities,” findings suggest “close to, or more than two-thirds of the responding CEOs recognized that online programs are strategically important to the institution” (McCarthy & Samors, 2009, p. 9).

**Students with Disabilities and Online Learning**

Evidently, the number of students with disabilities enrolled in degree-grating postsecondary institutions has also been on the rise (Opitz, 2002; Bradbard et al., 2010; Raue & Lewis, 2011). In the report published in 2011 by the U.S. Department of Education’s National Center for Education Statistics, Raue & Lewis (2011) explained, virtually “all public 2-year and 4-year institutions (99 percent) and medium and large institutions (100 percent) reported enrolling students with disabilities” (see Table 2). The report also noted that its data only represented the number of students who identified themselves to the campus as having one or more disabilities. While the majority of educational leaders at postsecondary campuses viewed online courses “as a way to maximize resources and faculty, but they soon learned that online course development and delivery is quite time sensitive” (Engleman, 2005). As a result, the concern for accessibility has been inadequate. Obviously, a combination of vast increase in total of online enrollments and the lack of strategic planning to accommodate online and distance students, especially those with disabilities, has been a contributing factor to the deficiency of accessible WBLC (Bradbard et al. 2010).
Table 2
Number of 2-year and 4-year degree-granting postsecondary institutions, and number and percent that enrolled students with disabilities, by institutional characteristics: 2008–09

<table>
<thead>
<tr>
<th>Institutional characteristic</th>
<th>Total number of institutions</th>
<th>Institutions enrolling students with disabilities</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Number</td>
</tr>
<tr>
<td>All institutions</td>
<td>4,170</td>
<td>3,680</td>
</tr>
<tr>
<td><strong>Institutional type</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Public 2-year</td>
<td>1,040</td>
<td>1,040</td>
</tr>
<tr>
<td>Private not-for-profit 2-year</td>
<td>110</td>
<td>90</td>
</tr>
<tr>
<td>Private for-profit 2-year</td>
<td>480</td>
<td>310</td>
</tr>
<tr>
<td>Public 4-year</td>
<td>630</td>
<td>620</td>
</tr>
<tr>
<td>Private not-for-profit 4-year</td>
<td>1,510</td>
<td>1,340</td>
</tr>
<tr>
<td>Private for-profit 4-year</td>
<td>390</td>
<td>290</td>
</tr>
<tr>
<td><strong>Size of institution</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than 3,000</td>
<td>2,720</td>
<td>2,230</td>
</tr>
<tr>
<td>3,000 to 9,999</td>
<td>960</td>
<td>960</td>
</tr>
<tr>
<td>10,000 or more</td>
<td>490</td>
<td>490</td>
</tr>
</tbody>
</table>

\(^1\)Rounds to 100 percent.


Common learning management systems (LMS) such as Moodle and Blackboard as well as a large amount of WBLCs on the Web appear to have rather limited ability to be fully accessible to all learners including postsecondary students with disabilities (Gorski, 2009; Foley & Ferri, 2012). Researchers and computer scientists have repeatedly pointed out that Web designers, developers, and content authors still pay little attention to accessibility (Engleman, 2005; de Macedo & Ulbricht, 2012). Bradbard et.al (2010) argued, “The issue at the heart of Web accessibility is that many Websites are designed with aesthetics, as opposed to equal access, as the goal” (p. 260).

Frequently, students with qualified disabilities who possess difficulties navigating and accessing WBLC would be referred to the campus’ accessibility specialists to seek support and
service while the rest of the class carry out business as usual (Bremer et al., 2002; Engleman, 2005). Although such “reasonable accommodation” may fulfill legal mandates to certain extent, the process to obtain services creates extra burdens on students. After all, this practice hinders the attainment of fully accessible and intuitive online learning environments for all students. More importantly, inaccessible online learning environments and WBLCs prolong the risks for postsecondary institutions to violate the accessibility standards as stated in section 508 of the Rehabilitation Act (see Table 3).

Table 3
Section 508 guidelines.

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Provide alternative text for all images</td>
<td></td>
</tr>
<tr>
<td>2. Provide alternative text for all image map hot-spots (AREAs)</td>
<td></td>
</tr>
<tr>
<td>3. Explicitly associate form controls and their labels with the LABEL element</td>
<td></td>
</tr>
<tr>
<td>4. Give each frame a title</td>
<td></td>
</tr>
<tr>
<td>5. Provide alternative text for each APPLET</td>
<td></td>
</tr>
<tr>
<td>6. Provide alternative text for all image-type buttons in forms</td>
<td></td>
</tr>
<tr>
<td>7. Include default, place-holding characters in edit boxes and text areas</td>
<td></td>
</tr>
<tr>
<td>8. Identify the language of the text</td>
<td></td>
</tr>
</tbody>
</table>

Note: Words in all capital letters indicate HTML tags.

Accessibility of the Web and Online Learning Environment

Web authoring and editing tools make the tasks of creating and publishing contents to the Web in an increasingly convenient fashion. Essentially, content creators can build more complex, multi-level, and media-rich pages to be available online. A number of studies have found that the websites with higher levels of complexity tend to present more accessibility issues. When websites and online contents are designed with little or without accessibility measures, they create access barriers to some users with disabilities. For instance, research
studies conducted between 2002 and 2004 found that 87% of selected 96 selected non-profit organizations’ and 75% of selected 250 Fortune 500 companies’ websites “had severe accessibility barriers” (Bradbard et al., 2010, p. 260).

These barriers, unfortunately, have been found on a large number of websites created and maintained by higher education institutions across the U.S, Canada, and Britain (see Table 4). As summarized by Bradbard et al. (2010), common accessibility issues often found include missing alternative text for graphical elements, videos without captions, audio files without text-based transcript, data tables that were too convoluted, and poorly designed site navigations. Likewise, webpages with low contrast, small fonts, missing headings, and improperly written codes further complicate the users’ ability to navigate, access, and interact with the contents.

Table 4

<table>
<thead>
<tr>
<th>Article</th>
<th>Sample</th>
<th>Key Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Anonymous, 2003)</td>
<td>100 home pages of British universities</td>
<td>33% failed to meet basic accessibility requirements</td>
</tr>
<tr>
<td>(Zaparyniuk &amp; Montgomerie, 2005)</td>
<td>350 home pages of Canadian postsecondary institutions</td>
<td>80% had some severe accessibility barriers</td>
</tr>
<tr>
<td>(Rowland &amp; Smith, 1999)</td>
<td>400 home pages of U. S. postsecondary institutions</td>
<td>78% had some accessibility barriers</td>
</tr>
<tr>
<td>(Hackett &amp; Parmanto, 2005)</td>
<td>45 home page and one-level down of members of the AAU</td>
<td>Pages at these institutions became progressively inaccessible as complexity increased</td>
</tr>
<tr>
<td>(Schmetzke, 1999)</td>
<td>13 university home pages and first layer of library pages for the University of Wisconsin state system</td>
<td>69% had severe accessibility barriers</td>
</tr>
<tr>
<td>(Lilly and Van Fleet, 2000)</td>
<td>100 Yahoo most wired U. S. colleges</td>
<td>60% had severe accessibility barriers</td>
</tr>
<tr>
<td>(Schmetzke, 2001b)</td>
<td>24 home pages of top ranked universities in library and information science</td>
<td>83% of main library sites had accessibility errors; 96% of library and information science sites had accessibility barriers</td>
</tr>
<tr>
<td>(Flowers, Bray, &amp; Algozzine, 1999)</td>
<td>89 home pages of special education programs at U. S. universities</td>
<td>73% had accessibility barriers</td>
</tr>
<tr>
<td>(Guitierrez &amp; Long, 2001-2002)</td>
<td>392 home pages of AACSB-accredited universities</td>
<td>68% had some form of accessibility barriers</td>
</tr>
<tr>
<td>Article</td>
<td>Sample</td>
<td>Key Findings</td>
</tr>
<tr>
<td>---------------------------------------------</td>
<td>------------------------------------------------------------------------</td>
<td>------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>(Schmetzke, 2001a)</td>
<td>219 home pages and pages linked to homepages of postsecondary distance</td>
<td>85% of the home pages had accessibility barriers; 77% of the pages linked to the home pages had accessibility barriers</td>
</tr>
<tr>
<td></td>
<td>education Web sites</td>
<td></td>
</tr>
<tr>
<td>(Schmetzke, 2001a)</td>
<td>12 home pages and pages directly linked to home pages of national</td>
<td>92% of the home pages had accessibility barriers; 82% of the pages linked to the home pages had accessibility barriers</td>
</tr>
<tr>
<td></td>
<td>organizations concerned with distance learning</td>
<td></td>
</tr>
<tr>
<td>(Spindler, 2002)</td>
<td>188 home pages of U. S. universities with enrollments between 5000-</td>
<td>74% of the home pages had some form of accessibility barrier</td>
</tr>
<tr>
<td></td>
<td>10,000</td>
<td></td>
</tr>
<tr>
<td>(Lewis, Yoder, Riley, So, &amp; Yusufal, 2007)</td>
<td>99 Instructional Web sites of departments</td>
<td>88% of the instructional Web sites had accessibility barriers</td>
</tr>
<tr>
<td>(Green &amp; Huprich, 2009)</td>
<td>12 top ranked schools of library and information science</td>
<td>Only two of 12 schools had no Section 508 errors on their library Web site</td>
</tr>
<tr>
<td>(Krach, 2007)</td>
<td>Three samples were examined; all highly ranked by U. S. News and World</td>
<td>The Web pages for all three samples were examined for compliance with Priority I levels of WCAG 1.0. The results were 30 of the 51 universities 12 of the 25 special education departments and 7 of the 23 educational psychology departments met Priority One accessibility requirements.</td>
</tr>
<tr>
<td></td>
<td>Report ranked: 51 universities, 25 special education departments, and</td>
<td></td>
</tr>
<tr>
<td></td>
<td>23 educational psychology departments</td>
<td></td>
</tr>
</tbody>
</table>


### Accessible WBLC for Online Education: The Roles of Faculty and Institution

Certainly, the strategic goal of creating and fostering accessible online programs cannot be achieved without the support and engagement of faculty (McCarthy & Samors, 2009, p. 27; Seaman, 2009). The extensive Faculty Survey commissioned by the APLU-Sloan National Commission on Online Learning (Online Commission) revealed that overall,

Driving faculty concerns is the pervasive belief that teaching or developing an online course requires more time and effort than for a comparable face-to-face offering (see Figure 2). Faculty rate this issue as the most important barrier to teaching and developing online programs. Faculty also report that they have serious reservations about the quality
of online learning outcomes, and they believe that their institutions are below average in providing support and incentives. (Seaman, 2009, p. 3)

**Figure 2.** Effort to Develop and Teach an Online Course Compared to Face-to-Face

Despite such “pervasive belief,” 56 percent of all participating faculty (both with and without online teaching experience) and 80 percent of faculty with online teaching or development experience reportedly recommended at least one online course to students (McCarthy & Samors, 2009, p. 19). Also, when asked why they teach online courses, faculty overwhelmingly cited the main reason was because online education meets “student needs for flexible access” (Seaman, 2009, p. 7).

While online enrollments continue to increase and generate the upward demand in online courses, faculty still find that “outside of technological infrastructure, institutions do not typically provide adequate incentives and support for online learning” (McCarthy & Samors, 2009). Indeed, being at the forefront of online course teaching and development, faculty members recognize that they would face a “steep learning curve necessary” to get the job done (Engleman, 2005). Furthermore, as Bradbard et al. (2010) describe in their comprehensive
review, “the fact that so many universities do not explicitly describe how to get training related to Web accessibility serves as an additional barrier” for faculty and authors to create accessible WBLC. In other words, many common accessibility issues such as missing image tags or captions for videos could have been prevented if there was adequate information, training, and support available.

The researchers also suggested that Web accessibility policies and standards have not been effectively established and reinforced at a large number of colleges and universities. Of the 50 postsecondary institution websites examined, the majority only provided brief descriptions of “responsibilities, validation tools, and contact information” and “more than half failed to cover (1) to whom the policy applies; (2) definitions; (3) information on training; (4) the time frame for implementation; (5) approval for the accessibility; (6) enforcement; and (7) violations of the standards” (Bradbard et al. 2010).

**Existing Measures to Support Students with Disabilities**

Because the online learning environment in general and WBLC in particular are not yet fully accessible, students with disabilities continue to face challenges when they take online courses. Since the section 504 standards require educational institutions that receive financial assistance from the federal government to ensure their WBLCs and websites are accessible to all students with qualified disabilities, the most common support measures are provided in forms of alternate media and assistive technology.

Depending on the type or a combination of disabilities such as visual, auditory, cognitive, and motor, students need to rely on one or more forms of assistive technology, to overcome the difficulties of inaccessible WBLCs (see Table 5).
Table 5
Examples of assistive technologies for various types of disabilities

<table>
<thead>
<tr>
<th>VISUAL DISABILITY</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Screen magnifiers</strong></td>
</tr>
<tr>
<td><strong>Screen reader</strong></td>
</tr>
<tr>
<td><strong>Speech recognition</strong></td>
</tr>
<tr>
<td><strong>Speech synthesizers</strong></td>
</tr>
<tr>
<td><strong>Refreshable Braille displays</strong></td>
</tr>
<tr>
<td><strong>Braille embossers</strong></td>
</tr>
<tr>
<td><strong>Talking word processors</strong></td>
</tr>
<tr>
<td><strong>Large-print word processors</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>AUDITORY DISABILITY</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Telecommunications Device for the Deaf</strong> (TDD)</td>
</tr>
<tr>
<td><strong>Closed captioning</strong></td>
</tr>
<tr>
<td><strong>ShowSounds</strong></td>
</tr>
<tr>
<td><strong>Light signaler</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>COGNITIVE DISABILITY</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Reading tools (text-to-speech)</strong></td>
</tr>
<tr>
<td><strong>Speech recognition software</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>MOTOR DISABILITY</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Alternate pointing devices</strong></td>
</tr>
<tr>
<td><strong>Predictive dictionaries</strong></td>
</tr>
<tr>
<td><strong>Speech recognition</strong></td>
</tr>
<tr>
<td><strong>Keyboard enhancements</strong></td>
</tr>
</tbody>
</table>


Additionally, when students with disabilities find it impossible to resolve the issues pertaining to inaccessible WBLC, the accessibility specialist would convert those inaccessible
files into appropriate formats, edit each file and perform quality-control tasks before providing alternate media to students. Alternate media, in other words, can be interpreted as the alternative accessible formats to specific type of inaccessible WBLC. For example, a student with a low-vision condition would receive a text-based version, to be read aloud using screen reader, of an image-based PDF file posted online or the transcript and descriptive videos of a short film that provide the details of events, characters, and other important related information that was implied and therefore could only be understood visually. Similarly, a student who possesses cognitive difficulties may also need the linear, text-based format of complex data tables or diagrams and utilize text-to-speech software to obtain information via audio.

According to the survey by the U.S. Department of Education, National Center for Education Statistics, during the 12-month period of the 2008-09 academic year, of the approximately 4,200 degree-granting, Title IV eligible 2-year and 4-year colleges and universities participating,

93 percent provided additional exam time as an accommodation to students with disabilities. Large percentages of institutions also provided classroom notetakers (77 percent), faculty-provided written course notes or assignments (72 percent), help with learning strategies or study skills (72 percent), alternative exam formats (71 percent), and adaptive equipment and technology (70 percent). (see Table 6)

Evidently, because the collected data based solely on the total number of students who identified themselves to the institutions as having one or more disabilities, the actual demand for mandated services and accommodations maybe higher than reported.
Table 6
Percent of 2-year and 4-year degree-granting postsecondary institutions enrolling students with disabilities that provided various services or accommodations to students with disabilities, by institutional characteristics: 2008-09

<table>
<thead>
<tr>
<th>Institutional characteristic</th>
<th>Sign language interpreters/ transliterators</th>
<th>Real-time captioning</th>
<th>Oral interpreters/ transliterators</th>
<th>Readers</th>
<th>Classroom notetakers or scribes</th>
<th>Faculty-provided written course notes or assignments</th>
<th>Adaptive equipment and technology</th>
<th>Physical adaptations to classrooms</th>
<th>Paratransit for on-campus mobility</th>
<th>Personal attendants</th>
<th>Independent living skills training</th>
<th>Audio textbooks/digitally recorded texts</th>
</tr>
</thead>
<tbody>
<tr>
<td>All institutions</td>
<td>48</td>
<td>25</td>
<td>22</td>
<td>62</td>
<td>77</td>
<td>72</td>
<td>70</td>
<td>58</td>
<td>14</td>
<td>7</td>
<td>4</td>
<td>66</td>
</tr>
<tr>
<td><strong>Institutional type</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Public 2-year</td>
<td>70</td>
<td>29</td>
<td>33</td>
<td>81</td>
<td>90</td>
<td>81</td>
<td>86</td>
<td>75</td>
<td>11</td>
<td>9</td>
<td>7</td>
<td>82</td>
</tr>
<tr>
<td>Private not-for-profit 2-year</td>
<td>1†</td>
<td>†</td>
<td>12!</td>
<td>46</td>
<td>56</td>
<td>50</td>
<td>52</td>
<td>20†</td>
<td>12†</td>
<td>6†</td>
<td>†</td>
<td>40</td>
</tr>
<tr>
<td>Private for-profit 2-year</td>
<td>29</td>
<td>10†</td>
<td>13</td>
<td>31</td>
<td>41</td>
<td>47</td>
<td>26</td>
<td>50</td>
<td>3†</td>
<td>10†</td>
<td>†</td>
<td>19</td>
</tr>
<tr>
<td>Public 4-year</td>
<td>69</td>
<td>43</td>
<td>28</td>
<td>79</td>
<td>92</td>
<td>79</td>
<td>87</td>
<td>74</td>
<td>30</td>
<td>4</td>
<td>7</td>
<td>88</td>
</tr>
<tr>
<td>Private not-for-profit 4-year</td>
<td>29</td>
<td>15</td>
<td>12</td>
<td>51</td>
<td>74</td>
<td>67</td>
<td>62</td>
<td>49</td>
<td>13</td>
<td>8</td>
<td>3</td>
<td>61</td>
</tr>
<tr>
<td>Private for-profit 4-year</td>
<td>52</td>
<td>35</td>
<td>31</td>
<td>48</td>
<td>54</td>
<td>74</td>
<td>61</td>
<td>28</td>
<td>5†</td>
<td>3†</td>
<td>3†</td>
<td>48</td>
</tr>
<tr>
<td><strong>Size of institution</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than 3,000</td>
<td>27</td>
<td>12</td>
<td>15</td>
<td>47</td>
<td>64</td>
<td>65</td>
<td>54</td>
<td>45</td>
<td>8</td>
<td>8</td>
<td>2</td>
<td>49</td>
</tr>
<tr>
<td>3,000 to 9,999</td>
<td>75</td>
<td>31</td>
<td>27</td>
<td>84</td>
<td>95</td>
<td>82</td>
<td>93</td>
<td>76</td>
<td>17</td>
<td>6</td>
<td>7</td>
<td>92</td>
</tr>
<tr>
<td>10,000 or more</td>
<td>96</td>
<td>67</td>
<td>45</td>
<td>91</td>
<td>99</td>
<td>80</td>
<td>98</td>
<td>86</td>
<td>34</td>
<td>4</td>
<td>9</td>
<td>97</td>
</tr>
</tbody>
</table>
Table 6 (Continued)
Percent of 2-year and 4-year degree-granting postsecondary institutions enrolling students with disabilities that provided various services or accommodations to students with disabilities, by institutional characteristics: 2008-09

<table>
<thead>
<tr>
<th>Institutional characteristic</th>
<th>Large print or Braille materials</th>
<th>Help with learning strategies or study skills</th>
<th>Tutors to assist with ongoing coursework</th>
<th>Alternative exam formats</th>
<th>Other</th>
<th>Additional exam time</th>
<th>Course substitution or waiver</th>
<th>Priority class registration</th>
<th>Disability resource handbook</th>
<th>Career or placement services targeted for students with disabilities</th>
<th>Disability benefits counseling</th>
<th>Counseling about vocational rehabilitation services</th>
<th>Moving classes to a more accessible location</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>All institutions ...............</td>
<td>51</td>
<td>72</td>
<td>58</td>
<td>71</td>
<td>93</td>
<td>35</td>
<td>42</td>
<td>38</td>
<td>26</td>
<td>11</td>
<td>44</td>
<td>46</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>Institutional type</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Public 2-year ..................</td>
<td>67</td>
<td>83</td>
<td>68</td>
<td>85</td>
<td>97</td>
<td>39</td>
<td>52</td>
<td>53</td>
<td>34</td>
<td>18</td>
<td>70</td>
<td>48</td>
<td>18</td>
<td></td>
</tr>
<tr>
<td>Private for-profit 2-year ......</td>
<td>12!</td>
<td>83</td>
<td>83</td>
<td>26</td>
<td>73</td>
<td>11!</td>
<td>22!</td>
<td>42</td>
<td>11!</td>
<td>21!</td>
<td>46</td>
<td>32</td>
<td>17!</td>
<td></td>
</tr>
<tr>
<td>Private for-profit 4-year ......</td>
<td>20</td>
<td>53</td>
<td>56</td>
<td>34</td>
<td>84</td>
<td>10!</td>
<td>9</td>
<td>7!</td>
<td>25</td>
<td>13</td>
<td>38</td>
<td>12</td>
<td>7!</td>
<td></td>
</tr>
<tr>
<td>Public 4-year ..................</td>
<td>73</td>
<td>76</td>
<td>50</td>
<td>89</td>
<td>99</td>
<td>61</td>
<td>70</td>
<td>52</td>
<td>37</td>
<td>14</td>
<td>58</td>
<td>67</td>
<td>21</td>
<td></td>
</tr>
<tr>
<td>Private not-for-profit 4-year ....</td>
<td>41</td>
<td>68</td>
<td>57</td>
<td>67</td>
<td>93</td>
<td>34</td>
<td>36</td>
<td>28</td>
<td>21</td>
<td>6</td>
<td>23</td>
<td>51</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>Private for-profit 4-year ......</td>
<td>40</td>
<td>56</td>
<td>43</td>
<td>55</td>
<td>77</td>
<td>8</td>
<td>21</td>
<td>32</td>
<td>7!</td>
<td>3!</td>
<td>18</td>
<td>7!</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td>Size of institution</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than 3,000 ...............</td>
<td>33</td>
<td>66</td>
<td>57</td>
<td>56</td>
<td>88</td>
<td>20</td>
<td>26</td>
<td>27</td>
<td>18</td>
<td>8</td>
<td>31</td>
<td>33</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td>3,000 to 9,999 ...............</td>
<td>74</td>
<td>82</td>
<td>65</td>
<td>92</td>
<td>99</td>
<td>91</td>
<td>62</td>
<td>50</td>
<td>34</td>
<td>16</td>
<td>62</td>
<td>60</td>
<td>18</td>
<td></td>
</tr>
<tr>
<td>10,000 or more ................</td>
<td>92</td>
<td>76</td>
<td>49</td>
<td>98</td>
<td>100</td>
<td>74</td>
<td>78</td>
<td>64</td>
<td>48</td>
<td>16</td>
<td>66</td>
<td>76</td>
<td>23</td>
<td></td>
</tr>
</tbody>
</table>

1 Interpret data with caution; the coefficient of variation is greater than 50 percent.
2 Reporting standards not met.
Adaptive equipment and technology includes assistive listening devices and talking computers.
Alternative exam formats include large print, Braille, and audio formats.
Disability benefits counseling includes Supplemental Security Income (SSI), Social Security Disability Income (SSDI), Medicare, and Medicaid.

Note: Percentages are based on the 88 percent of institutions that enrolled students with disabilities in the 12-month 2008-09 academic year. Information about students with disabilities represents only those students who identified themselves to their institution as having a disability, since these are the only students about whom the institutions could report. The accommodations in the table are not an exhaustive list of either the accommodations a student may need or the accommodations an institution may provide.

Universal Design for Learning

Since the early 2000s, existing literature indicates evidence of the growing varieties of assistive technologies and alternate media playing an important role in providing valuable supports to students with disabilities as they face the challenges of inaccessible WBLC while taking online courses (Burgstahler et al., 2004; Sapp, 2009; Zeff, 2007). However, the process to obtain these services and accommodations often means a tremendous amount of extra time and effort from the student to complete the required additional paperwork such as request forms, proof of qualified disabilities. Ultimately, students with disabilities receive their “reasonable accommodations” to access WBLC but not the full and equal access (Fox et al., 2003; Higbee, 2003; Silver, Bourke, & Strehorn, 1998). Over the years, researchers, educators, computer scientists, and legislators have been promoting the implementation of Universal Design for Learning (UDL) guidelines as academic strategy to enhance access and achievement for all students including students with disabilities, an underrepresented population within higher education campuses across the U.S. (Burgstahler et al., 2004, Izzy, 2012; Sapp, 2009). The Higher Education Opportunity Act (Public Law 110-315) (HEOA) of 2008 defines the term UDL as,

a scientifically valid framework for guiding educational practice that a) provides flexibility in the ways information is presented, in the ways students respond or demonstrate knowledge and skills, and in the ways students are engaged; and b) reduces barriers in instruction, provides appropriate accommodations, supports, and challenges, and maintains high achievement expectations for all students, including students with disabilities and students who are limited English proficient. (U.S. Congress, 2008)
Following Ronal L. Mace’s concepts of Universal Design to promote barrier-free physical environments for everyone (Mace, 1985), UDL guidelines aim to provide all learners with “choices and alternatives in the materials, content, tools, context, and supports they use” (Izzy, 2012; Silver, Bourke, & Strehorn, 1998). The National Center on Universal Design for Learning provided an extensive set of guidelines based on the following three main principles:

**Principle I: Provide Multiple Means of Representation** (the “what” of learning). Learners differ in the ways that they perceive and comprehend information that is presented to them. For example, those with sensory disabilities (e.g., blindness or deafness); learning disabilities (e.g., dyslexia); language or cultural differences, and so forth may all require different ways of approaching content. Others may simply grasp information quicker or more efficiently through visual or auditory means rather than printed text. Also learning, and transfer of learning, occurs when multiple representations are used, because it allows students to make connections within, as well as between, concepts. In short, there is not one means of representation that will be optimal for all learners; *providing options for representation is essential.*

**Principle II: Provide Multiple Means of Action and Expression** (the “how” of learning). Learners differ in the ways that they can navigate a learning environment and express what they know. For example, individuals with significant movement impairments (e.g., cerebral palsy), those who struggle with strategic and organizational abilities (executive function disorders), those who have language barriers, and so forth approach learning tasks very differently. Some may be able to express themselves well in written text but not speech, and vice versa. It should also be recognized that action and expression require a great deal of strategy, practice, and organization, and this is another
are in which learners can differ. In reality, there is not one means of action and expression that will be optimal for all learners; providing options for action and expression is essential.

**Principle III: Provide Multiple Means of Engagement** (the “why” of learning). Affect represents a crucial element to learning, and learners differ markedly in the ways in which they can be engaged or motivated to learn. There are a variety of sources that can influence individual variation in affect including neurology, culture, personal relevance, subjectivity, and background knowledge, along with a variety of other factors presented in these guidelines. Some learners are highly engaged by spontaneity and novelty while other are disengaged, even frightened, by those aspects, preferring strict routine. Some learners might like to work alone, while others prefer to work with their peers. In reality, there is not one means of engagement that will be optimal for all learners in all contexts; providing multiple options for engagement is essential. (*CAST, 2011*)

Specifically, to address the issue in which instructors often find themselves being “forced to make difficult attempts at adapting inflexible ‘one-size-fits-all’ curricular elements that were not designed to meet the variability of individual learners,” UDL suggested the modification and adaptation of curricula that are “intentionally and systematically designed from the beginning to address individual differences,” not after-the-fact. In other words, the key focus areas of UDL principles promote the flexible and student-centered learning environments, both face-to-face and online, in which the learning contents can be accessed by all students at all time without the need for additional “retrofitting” solutions (p. 9). While it appears to be a daunting task to make sure WBLCs are accessible for all learners in the beginning, the results will not only benefit the students but also the instructors who possess marketable skills and abilities that enable them to
successfully create and implement inclusive online learning environments for all learners including individuals with disabilities.

**Content Development of Accessible Learning Objects**

Studies show students with disabilities who take online courses face “two main issues in relation to computer-based learning materials: access and comprehension” (Sapp, 2009). Thus, at the beginning and during the process of planning and designing online learning websites and WBLC, it is critical for developers, designers, and authors to acquire basic understandings of a various common media types and assistive technology. More importantly, accessibility always should be considered as an integral aspect of the process and not an additional or separate activity (de Macedo & Ulbricht, 2012). Most commonly used elements within online learning environments that often involve some form of accessibility issues are: moving images, static images, texts, data tables, graphs and charts, and audios. Table 7 presents information and methods for content authors who utilize media elements to create WBLC that will meet the accessibility objectives for visual, hearing, and cognitive disabilities.

**Table 7**

*Guidelines for Content Development of Accessible Learning Objects*

<table>
<thead>
<tr>
<th>Elements</th>
<th>Important to consider</th>
</tr>
</thead>
</table>
| Moving images (i.e.: standalone videos, videos with sound, animations) | • Title or a description of the subject (visual)  
• Subtitles or captions, audio descriptions (visual, hearing)  
• Sound and image synchronized (visual, hearing)  
• Sign language interpretation (hearing, cognitive) |
| Static images (i.e: photographs, diagrams, graphs, charts, tables, drawings, ansii art, logos, | Static images must possess: alternate media, high contrast, scalability  
• Alternative or equivalent text (visual, cognitive)  
• Complete equivalent description (visual, cognitive)  
• *Optional* grayscale image (visual, color-blindness) |
### Elements

<table>
<thead>
<tr>
<th>Important to consider</th>
</tr>
</thead>
<tbody>
<tr>
<td>buttons, images as links)</td>
</tr>
<tr>
<td>• Simplified image for touch printing (visual)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Texts</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Background in solid colors (visual, cognitive)</td>
</tr>
<tr>
<td>• Switchable color, noticeable in gray scale (visual, cognitive, color-blindness)</td>
</tr>
<tr>
<td>• Text-based for texts presented in an image format (visual)</td>
</tr>
<tr>
<td>• Structures: headings &amp; hierarchy, 80 or less characters per line</td>
</tr>
<tr>
<td>• Graphic or audible equivalents for texts (visual, cognitive)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Tables</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Linear reading order (top to bottom, left to right)</td>
</tr>
<tr>
<td>• Clear identification for table title, header, rows and columns</td>
</tr>
<tr>
<td>• Present table summary</td>
</tr>
<tr>
<td>• Simplify complex tables into separate, simpler ones</td>
</tr>
<tr>
<td>• Do not use tables for formatting, distribution of content or layout.</td>
</tr>
<tr>
<td>• Caption and summary to describe the function of the table and its format. (All: visual, cognitive)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Graphs and charts (i.e.: vertical bar, horizontal line, pie charts)</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Descriptive text of chart’s layout, variable’s locations and results</td>
</tr>
<tr>
<td>• Subtitles describe summary</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Audios</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Content in audio must have:</td>
</tr>
<tr>
<td>• Subtitles, caption or complete description.</td>
</tr>
<tr>
<td>• Visual alternative text.</td>
</tr>
<tr>
<td>• Volume control, pauses, play, stops. All visible.</td>
</tr>
</tbody>
</table>


### Web Content Accessibility Guidelines (WCAG) 2.0

The Web Content Accessibility Guidelines (WCAG) 2.0 were developed, introduced and continue to be updated by the World Wide Web Consortium (W3C). Research findings pointed out that a large number of websites, including online learning systems created and maintained by higher education institutions across the U.S. presented accessibility issues under both 508 guidelines and WCAG (Harper & DeWaters, 2008). In fact, the section 508 guidelines and WCAG share some important similarities in addressing accessibility issues and, as Harper &
DeWaters (2008) explained, both guidelines can “be measured through (1) accessing online tools and (2) identifying the extent to which websites are accessible to people with varying exceptionalities” (p. 161). There are 65 checkpoints listed in the three priorities that web developers should keep in mind. These three priorities can be simplified for quick and easy reference as represented in Table 8. They are:

**Priority 1:** A Web content developer *must* satisfy this checkpoint as it contains the basic requirements for a so-called accessible website. Otherwise, one or more groups will not be able to access information in the document. Satisfying this checkpoint is a basic requirement for some groups to be able to use Web documents. These sixteen points are obligatory to ensure the minimum level of web accessibility. Meeting all sixteen points, websites are awarded a single ‘A’ grade certifying web accessibility. Errors found in the Priority 1 checkpoint are showstoppers and barriers that prevent some people from accessing information altogether.

**Priority 2:** Priority 2 provides a level of *double* ‘A’ certification representing 35 checkpoints. Failure at one or more of these checkpoints will produce barriers for access to information, but do not prevent access entirely. A Web Content developer should satisfy these checkpoints in order to remove significant barriers to access information in the document.

**Priority 3:** A Web content developer may address this checkpoint. Otherwise, one or more groups will find it somewhat difficult to access information in the document. This level includes a Triple ‘A’ certification, representing 24 checkpoints and features that are nice to have yet difficult to achieve. (This level, lacking the efficiency and effectiveness
of the other two, allows users with disabilities to access information without significant barriers.) A web content developer often addresses this checkpoint to improve access to web documents for a larger user population. Some checkpoints specify a priority level that may change under certain (indicated) conditions.

(Harper & DeWaters, 2008 p. 161)

<table>
<thead>
<tr>
<th>Priority</th>
<th>Errors</th>
<th>Explanation</th>
<th>Fix</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Not using an alternative method to convey information that appears in color</td>
<td>The site uses color to recognize information. A colorblind person may need to identify a color.</td>
<td>Provide an alternative tag, which is a piece of code that is embedded in the Web page that when a user moves the browser over the page there is a pop-up message</td>
</tr>
<tr>
<td></td>
<td>Not using alternative text for all images</td>
<td>There is no text to describe or title the image</td>
<td>Provide a label or title of the image</td>
</tr>
<tr>
<td>II</td>
<td>Not contrasting sufficiently the foreground and background colors.</td>
<td>A person who is colorblind needs to have enough contrast of colors to distinguish between items.</td>
<td>Use contrasting colors in images, diagrams, and figures</td>
</tr>
<tr>
<td></td>
<td>Avoiding movement in images</td>
<td>Do not provide simulations, animated gifs, and video</td>
<td>If the animated gif is used to provide information, alternative text is needed to provide an explanation of the movement concepts. Provide sound or transcript of the video</td>
</tr>
<tr>
<td>III</td>
<td>Not including keyboard shortcuts to frequently used links</td>
<td>Exclusion of an alternate means of navigating the page</td>
<td>Include the keyboard Shortcuts</td>
</tr>
</tbody>
</table>
Not specifying a logical tab order among form controls, links, and objects  
Exclusion of an alternate mean of navigating the page  
Include the tab shortcuts


**Summary**

In the past two decades, researchers, educators, and policy makers increasingly recognize the substantial growth of online education and its implementation within postsecondary institutions. This phenomenon coupled alongside with recent assistive technology legislations such as the Higher Education Opportunity Act of 2008 (HEOA) and the Americans with Disabilities Act Amendments Act of 2008 (ADAA) bring up the issues pertaining to accessibility for the Web and WBLC to the spotlight (Harper & DeWaters, 2008; Hill, 2013; Izzo, 2012; Roberts et al., 2011, p. 242). While evidence of progress has been visible, students with disabilities still find it difficult and, in many cases, impossible to navigate and access online learning contents. Studies indicated a number of factors that contributed toward the issues of inaccessible WBLCs ranging from the lack of support, training, and funding for faculty to the inadequate establishment and reinforcement of accessibility policies at many campuses. In addition, colleges and universities still rely on the support of a small group of accessibility specialists to provide “after-the-fact” services and accommodations to students with disabilities who face challenges because of inaccessible WBLC (Burgstahler, Corrigan & McCarter, 2004; Hawke & Jannarone, 2002; Wall & Sarver, 2003).

With the number of students with disabilities enrolled at postsecondary institutions, both in face-to-face and online, at a record high, the practice in which providing them with minimum “reasonable accommodations” will affect the quality of education the students receive. The process of creating and providing alternate media such as Braille, electronic text, and auditory
learning materials is complicated, lengthy and costly. More importantly, reasonable accommodations should not be considered as the only option for student with disabilities since they no longer belong to an inclusive learning environment.

The suggested implementations based on the principles of UDL and WCAG 2.0 standards may help improve and streamline the process of planning and designing online courses that are easy for all students including those with disabilities to access, participate, and learn independently. Also, courses designed with accessibility measures will not only meet the regulated standards but will also be much more flexible for instructors and course authors to replicate, update, or modify in the future.
CHAPTER III: RESEARCH DESIGN

Research Questions and Introduction

The following research questions help guide the direction of this study:

What are the difficulties that college students with disabilities have experienced when they navigate and access online instructional materials?

- Sub – Question #1: How do college students with disabilities overcome the difficulties of inaccessible online learning content?
- Sub – Question #2: What suggestions do students with disabilities have for instructors, authors, and instructional designers to ensure online learning contents accessible?
- Sub – Question #3: How do Universal Design for Learning (UDL) principles and Web Contents Accessibility Guidelines (WCAG) 2.0 help to ensure web-based learning contents (WBLC) accessible to college students with disabilities?

As detailed in chapter 2, the discourses exhibited throughout many research studies pertaining to the inaccessibility of WBLC often comprise tenets that involve overly specialized technological intricacies. Such intricacies in existing literature hardly benefit the wider audiences of educators and practitioners who are interested in seeking solutions from scholarly works to improve their practices because they often find the materials overwhelmingly intimidating. Thus, I find it increasingly important to emphasize the need for research studies that promote the effort of humanizing the discourses pertaining to educational technology and accessibility that would reach a wider audience by collecting the individual experiences through their own voices and retelling of their stories. In the last few decades, qualitative researchers increasingly employ narrative inquiry to accomplish this form of research studies (Andrews, Squire, & Tamboukou, 2013; Bruner, 1986; Chase, 2005; Clandinin, 2007; Clandinin & Connelly, 2000; Connelly &
Clandinin, 2006; Gubrium & Holstein, 1997; Hinchman & Hinchman, 2001; Laslett, 1999; Polkinghorne, 1995; Polkinghorne, 1995; Riessman, 2008; Wells, 2011). In Figure 3, I outline the steps involved in conducting this narrative research using Creswell’s (2007) model.

**Figure 3. Steps in Conducting Narrative Research.**
Miles, Huberman & Saldaña (2013) write, “No study conforms exactly to a standard methodology; each one calls for the researcher to bend the methodology to the uniqueness of the setting or case” (p. 7). Appropriately, because the overarching goal of this study is to document and present the participants’ lived experiences in an effort to examine the problem of practice using the participant’s point of view, a narrative inquiry research method is the suitable choice (Creswell, 2007). Also, by using a qualitative research method, researchers are able to analyze and report their findings using “flexible, emerging structures and evaluative criteria” which is evidently relevant to the goals of this investigation in which I seek to provide “a voice for seldom-heard individuals” and address the “issues such as oppression, domination, suppression, alienation, and hegemony” (Creswell, 2002, p. 16, p. 528; Creswell, 2012, pp. 21-22). As a supporter of Dewey’s (1935) works, I am also inspired by the writings of Jenlink’s (2014) that describe scholar-practitioners as “democratic educational leaders” as well as “public intellectuals” who focus their professional purposes on “leading for social justice and promoting equity through democratic and civil discourse” (p. 212). As Jenlink (2003) also elaborates, scholar-practitioners continue to improve professionally upon the foundation of “diverse conceptual, theoretical, philosophical, and methodological tools” with which they “create a bricolage of scholarly practice, shaping one’s identity and at the same time working to enable ‘Others’ to develop identities” (pp. 5-6). Dewey’s (1909) notions on the role and responsibilities of moral educators, in many ways, inform the direction of my research methodology. Further details on research design are described in the following sections.

Paradigm and Interpretive Framework

Research paradigms or “worldviews” are assumptions that reflect the researchers’ “particular stance” on the problem of practice as they proceed with the process of conducting
qualitative studies (Creswell, 2012; Ponterotto, 2005). As Guba (1990, p. 17) and Creswell (2012, pp. 17—19) explain, research paradigm plays an important role in the researcher’s investigation. Indeed, a research paradigm is comprised of the “basic set of beliefs that guide action” which informs, supports, and justifies the study including the decisions to investigate a specific problem of practice and the construct of the research methods. It is exceedingly apparent throughout the writing in this study that the “disability interpretative lens” has been utilized as the central component of the research paradigm (Creswell, 2012, pp. 33—38). As highlighted in the theoretical framework section of Chapter 1, by suggesting the emphasis on signifying the voices and lived experiences of the participants, this study affirms the application of a “disability interpretive lens” through which disability is recognized “as one dimension of human difference” and thus should be considered widely as the reason for changes toward a more inclusive society (Creswell, 2012, p. 34—38; Mertens, 2003).

Specifically, the selected interpretive framework is well aligned with the theoretical basis of the Critical Disability Theory (CDT) in which it promotes the “inclusion, equality and autonomy” of individuals with disabilities through “the transformation of society” that enable them, “in all their diversity,” to “fully integrated into their communities” as “equal participants” (Hosking, 2008). In addition, as Devlin & Pothier (2006) and Hosking (2008) validate, CDT synthesizes both “the medical and social models” into, according to the World Health Organization, the “biopsychosocial model” in which it balances the “contributions of impairment, personal responses to impairment and the barriers imposed by the social environment to the concept of disability.”

CDT encourages scholars and practitioners to continue the discourse pertaining to the “concept of normalcy, fundamental values of individual dignity and respect in democratic
societies, and issues at the intersection of disability with class, gender, race, sexual orientation, ethnicity and other socially constructed categories” (Hosking, 2008, pp. 7—8). Appropriately, CDT informs and serves this study as a theoretical lens—the “guiding perspective that provides the structure for advocating” for the group of selected participants and, by extension, other students with qualified print-related disabilities who continue to face challenges as the result of inaccessible WBLC while taking online and hybrid courses (Creswell, 2002, p. 505).

**Analysis of Narratives**

Narrative inquiry is considered one of the most effective methods for qualitative researchers to understand and describe human actions, to share stories from lived experiences by organizing events and artifacts in a meaningful, thematic, and sequential way (Bruner, 1986; Chase, 2005; Gubrium & Holstein, 1997; Hinchman & Hinchman, 2001; Laslett, 1999; Polkinghorne, 1995). The subject matter of stories, Polkinghorne (1995) writes, “is human action” and that “stories are concerned with human attempts to progress to a solution, clarification, or unraveling of an incomplete situation” (p. 7).

Stories and storytelling, as Riessman (2008) explains, “reveal truths about human experiences” and serve as a valuable investigative method which enables the investigator to “engage, convince, and move an audience” in a powerful way that could potentially “mobilize others into action for progressive social change” (pp. 9-10). Thus, there has been an increasing interest in narrative inquiry among qualitative researchers in the fields of social sciences, education, and others (Andrews, Squire, & Tamboukou, 2013; Chase, 2005; Clandinin, 2007; Clandinin & Connelly, 2000; Polkinghorne, 1995; Riessman, 2008; Wells, 2011). In fact, narrative inquiries have become so popular in the last three decades that it “seems as if all social researchers are doing narrative research in some way” (Andrews, Squire, & Tamboukou, 2013).
This study utilizes a “narrative configuration” that Polkinghorne (1995) calls “analysis of narrative” (p. 5). Based on one of Bruner’s (1986) definitions of cognition, the “paradigmatic mode of thought,” Polkinghorne (1995) categorizes analysis of narratives as the “paradigmatic-type” of narrative inquiry with which the researcher “collects storied accounts for its data” and “uses an analytic process that identifies aspects of the data as instances of categories” that ultimately helps produce the knowledge of “general notions or concepts.” To achieve this goal, the researcher proceeds to “locate common themes or conceptual manifestations among the stories collected” from a database that consists of “several stories (rather than a single story)” and display the “relational significance” presented throughout the collected data. Findings of the investigation, as Polkinghorne (1995) writes, “are derived from previous theory or logical possibilities and are applied to the data to determine whether instances of these concepts are to be found” (pp. 7—13).

Accordingly, the data collection and data analysis strategies in this study are specifically selected as outlined in Polkinghorne’s (1995) analysis of narrative method to present the narratives of five students with disabilities who overcome the challenges as the results of inaccessible WBLC while taking online courses. While I find it necessary, as documented in chapters 1 and 2, to illustrate the evidence of inaccessible WBLC, it is more important to put the emphasis on how it negatively affects the learning experiences of each participant. Using Polkinghorne’s (1995) analysis of narratives as a guide, I a) examine the data “to determine whether they fit with a predetermined network” and; b) proceed to seek “a second level of analysis that identifies the relationships that hold between and among the established categories” (p. 10). The following sections of this chapter discuss the details of my process to collect, analyze, describe qualitative data.
Research Site and Participants

In a narrative study, the applicable sampling strategy focuses on identifying and recruiting the participants whose stories are the most relevant to the research question. Creswell (2007) writes, the “inquirer selects individuals and sites for study because they can purposefully inform an understanding of the research problem and central phenomenon in the study” (p. 125). In other words, this study collects and presents “second-order” narratives in which “the researcher constructs the narratives about other people’s experiences,” not the researchers own lived experiences as in “first-order” narrative (Creswell, 2007).

This study takes place at a four-year public university in Northern California. The university is considered medium-size with approximately nearly 10,000 enrolled students. The researcher conducts intake phone interviews before selecting a total of 5 participants to participate in this study. All selected participants are students with qualified print-related disabilities who meet the following criteria: a) the participant currently is or had enrolled in at least one online/hybrid course; b) the participant utilizes at least one form of assistive technology such as a screen reader, voice recognition, and text-to-speech applications in order to participate in and perform required classroom-related activities; and c) the participant possesses challenging experience(s) while navigating online learning environments or difficulties accessing learning contents. During the recruitment process, the researcher attempted to include a diverse group of participants in terms of gender, age, and type of disability.

Recruitment and Consent Process

The researcher receives formal approval from the Institutional Review Board and begins the process to obtain permission from the university’s appropriate official to: a) send via e-mail the electronic version; and b) post printed version of the “Call for Participants” flyer (Appendix
B) to various schools and departments at the research site. Upon receiving responses from interested individuals, the researcher contacts each potential participant by phone to provide a brief introduction about the research including the purposes and timeline.

During the intake process, the researcher provides detailed descriptions of the research, explains the participant’s role in the process as well as verifies whether all criteria are met. The researcher also answers any question and addresses any concern that the potential participants may have. Selected participants for this study are university students who are fluent in English and possess college-level skills in reading and writing, and who are thus able to comprehend both verbal and provided written consents. Interview sessions are recorded with proper consent and permission from the participants. Prior to beginning each interview session, the researcher provides the participant with an unsigned consent form, reads the form aloud, and answers any question or concern that the participant may have. Next, the researcher requests the participant’s permission to begin recording the interview session. All verbal consents of the participants are recorded.

Confidentiality

Confidentiality is always maintained with regards to collected data whether it is used for the purpose of this doctoral dissertation or future scholarly works, teaching, and conference presentations. Each participant is assigned a unique pseudonym. The pseudonym was generated randomly using the first letter of the participant’s last name. For instance, a participant with the last name Smith may be referred to under the pseudonym Sam. The researcher does not disclose specific information that may be used to identify the participants. Only the researcher has full access to collected data. The professional transcriber is selected based on extensive experiences working with postsecondary students with disabilities and thoroughly understands the
importance of maintaining strict confidentiality. The professional transcriber is required to read and sign the Transcriber Confidentiality Statement and the researcher keeps the original copy on file. The professional transcriber only has access to specific digital audio files that the researcher provides.

**Risk and Safeguard**

While participants disclose and describe details regarding their disabilities and the challenges they faced during the course of their educational career, the possibility of risks is minimal. The researcher makes it clear that participation is voluntary and that the participants may choose to decline answering any question or withdraw their participation from the study at any time. The interview location on the research floor at the university’s library has been purposely selected to ensure: a) the participants will find the environment comfortable, familiar, and safe; b) the conversations between the researcher and participants take place behind closed door to provide privacy and maintain confidentiality.

In addition, the researcher holds a valid certificate (NIH #1318747) upon completing the required Web-based training course titled Protecting Human Research Participants by the National Institutes of Health (NIH) Office of Extramural Research. This course is one of the requirements of the final research design course at Northeastern University as well as one of the requirements to obtain approval by the Institutional Review Board (IRB) prior to conducting research. Copies of the NIH certificate and approved IRB notice are included in the Appendix.

**Data Collection**

Qualitative data for this study is collected using the in-depth interview protocols approved by the IRB’s at Northeastern University and the research cite. The researcher records a total of ten interview sessions. In addition, the researcher possesses extensive opportunities for
long-term observations through working closely with five selected participants. After completing the initial 5 to 10-minutes intake call, the researcher arranges two (2) interview sessions with each selected participant. Each individual interview session varies from 60 minutes to over two hours consisting of open-ended format interview questions. All interview sessions are recorded on three different devices to avoid failure(s) due to technical difficulties. Transcripts of the interview sessions are professionally transcribed. The researcher offers participants the options to review their transcripts in printed or digital format and asks them to validate detailed information and to make any amendment(s) to the transcript if necessary.

Data Storage

Audios from interview sessions, field notes, and transcripts are stored in digital format in password-protected cloud storage and accessed by only the researcher and the principal investigator. The researcher also stores handwritten field notes and printed materials such as consents, agreements, and other forms in a locked file cabinet. Printed materials, handwritten notes, and digital files on cloud storage will be deleted two years after the study is completed.

Data Analysis

Qualitative data provides the researchers with a tremendous advantage of having “a source of well-grounded, rich descriptions and explanations of human processes” (Miles, Huberman, & Saldaña, 2013). In addition to the transcripts and field notes, the researcher meets and interacts with all five participants on a regular basis throughout their educational careers. Having the opportunities to provide consultations and accommodations to the participants, the researcher possesses extensive insights from observing the statuses of participant’s online learning environments as well as the WBLC in each online course. These conditions are beneficial for a narrative inquiry research in which it provides the researcher with “concrete,
contextual biographical materials” needed for an extensive database (Creswell, 2012, p. 192).

To streamline the tasks involved in each stage of the data analysis process, I use MAXQDA—a robust and highly customizable qualitative data analysis software—to import and organize all Word, PDF, and other digital files of the reviewed transcripts, field notes, and additional artifacts. In MAXQDA, I am able to quickly view and compare several files at the same time using separate tabs when needed. The application allows me to manually create, manage, and store all codes in one single project and automatically saves as changes are made. Details regarding the selected coding strategy and methods will be discussed next.

**Coding Methods**

I utilize Saldaña’s (2013) “coding cycles” strategy in which coding is divided into “two main sections: First Cycle and Second Cycle” (p. 58). As described in Miles, Huberman & Saldaña (2013) and Saldaña (2013), depending on the designs of research questions, methodology, and data format, each coding cycle may use one or a combination of “mixed and matched” methods for application in a particular study.

In the First Cycle, “Attribute Coding” is appropriate due to the fact that students with disabilities at postsecondary levels including the five participants in this study possess a wide varieties of skill set and knowledge of alternate media, assistive technologies as well as experiences working within online learning environments and dealing with different types of inaccessible WBLC. Indeed, Attribute Coding method is highly effective in terms of organizing and presenting each participant’s unique personal characteristics and necessary contextual information that constructs their profiles in a comprehensive manner (Saldaña, 2013). Also in the First Cycle, I apply “Structural Coding” method to identify “large segments of text on broad topics” which forms “the basis for an in-depth analysis within or across topics” in the Second
Cycle (MacQueen et al., 2008, p. 125). According to Saldaña (2013, p. 84), Structural Coding is especially “more suitable for interview transcripts” because this method applies “question-based” codes that serve as “a labeling and indexing analysis from a larger data set” (Namey et. al, 2008, p. 141). These preparatory steps are vital as it creates a vigorous foundation for the subsequent stages of the Second Cycle in which a more detailed coding method is applied (Saldaña, 2013).

The primary goal of the Second Cycle coding, Saldaña (2013) writes, is “to develop a sense of categorical, thematic, conceptual, and/or theoretical organization” from the previously labeled and indexed data corpus during the First Cycle (p. 207). Thus, I employ the Elaborate Coding, as Auerbach & Silverstein (2003) explains, a “top-down” coding method in which the researcher analyzes the “textual data” in order to “refine theoretical constructs from a previous study” and thus while coding, the “relevant text is selected with those constructs in mind” (p. 104). Saldaña (2013) also adds, Elaborate Coding is a suitable method for “qualitative studies that build on or corroborate previous research and investigations” and basically “elaborates on the major theoretical findings” in existing literature (p. 229). Indeed, the overarching goal of this study is to accentuate the issues pertaining to inaccessible online learning environments and WBLC. This problem of practice, as previously documented and detailed in chapters 1 and 2, continues to present barriers to students with disabilities attending colleges and universities across the United States.

**Research Trustworthiness Using Triangulation**

While conducting research studies, qualitative researchers corroborate “evidence from different sources to shed light on a theme or perspective” using “multiple and different sources, methods, investigators, and theories” (Creswell, 2012, pp. 250-51). This process is called “triangulation” and it is an important aspect of the research in order to establish authenticity and
validity (Creswell, 2012; Miles, Huberman & Saldaña, 2013). Throughout the course of this study, my validation strategy involves a) addressing the details of my biases as a researcher; b) seeking peer reviews through debriefing sessions with my advisors; c) facilitating member checking activities in which I solicit feedbacks from the participants; and d) making efforts to provide rich, thick descriptions to provide readers with as much informed details as possible (Creswell, 2002; 2012, p. 252).
CHAPTER IV: NARRATIVES

In this study, I intend to address the issues pertaining to inaccessible online learning environments and Web-based learning contents (WBLC) through the stories told by five participants: Mario, Hanna, Ella, Sophie, and Ryan. I asked the participants to share with me how they perceive their lived experiences as university students with disabilities taking online and hybrid courses during their educational careers. This chapter presents their individual narratives.

Working in the role of an Alternate Media/Assistive Technology Specialist, I spend more time with each participant as a practitioner than I do in the role of researcher. As a practitioner, I get to know each participant well through working to provide various types of alternate media as accommodations as well as continuous training and consultation sessions in assistive technologies. As an educational researcher, I am interested in the unique experience that emerges from each individual’s observation and perspective as learner.

Through one-to-one interview sessions with each participant, I discover more insights into a number of areas pertaining to the problem of practice from which I organize the structure of each narrative including: a) introductory paragraphs briefly describe the participant’s documented disabilities and their educational and career goal; b) key details pertaining to the participant’s alternate media and assistive technology services, academic accommodations and interactions with faculty members; c) the participant’s perception of specific structural elements and functionality of the online learning management system such as navigation, search, discussion board, or methods of communications; and d) the participant’s perception of accessing course materials using their existing assistive technologies as well as suggestions they
may have for individuals such as the online learning management system administrators and Web-based content creators.

**Mario’s Story**

Toward the end of the Spring 2015 semester, Mario was a busy college senior. The 29-year-old engineering major was just about to finish up the last ten credits to graduate with a Bachelor of Science in Electrical Engineering. I had interview sessions with Mario during the first week of May 2015 when his schedule opened up. I congratulated him on the upcoming graduation as we began our conversation. Mario seemed relieved and excited at the same time as he talked about his plans in the future. Working as an accessibility consultant, I was delighted to hear Mario explained that after graduating from the university, he would like to work as an accessibility engineer at one of the tech companies around the Bay Area like Apple, Google or Facebook. His goal would be to work with the design and production teams as well as other engineers and help them make sure their final products are inclusive to all users.

Having earned the 3.6 GPA on the courses he finished at his current university, Mario worked hard to prove he would excel in the field. More importantly, he knows firsthand what should be done to make software and online environments more accessible for users with low-vision or blind conditions. To navigate online environments and access Web-based contents, Mario utilizes the magnification, text-to-speech, and voice recognition features in various software applications and operating systems on both computer and mobile devices on a regular basis. Here is Mario’s story.

**Disability**

It started in 2007… 2006, maybe 2006. I’m completely blind in one eye, and I have I think about twenty percent of the vision left in the other eye. With that twenty percent of vision
that I have, I am able to read some stuff on the screen; it just takes me quite a bit longer because I’m doing it with one eye. So when I navigate online environments and access online contents, I just use the zoom feature in the program itself. For example, I use Google Chrome to browse the Web and read online articles. In Google Chrome there’s a zoom feature. It’s very helpful.

**Alternate Media**

When I take these online or hybrid courses, I have the academic accommodations from the office of Disability Services for Students, which I’m very thankful to have their office at our university… They convert all of my textbooks from a printed material into an electronic version.

I installed a program on my laptop called Dropbox\(^1\) and it allows the alternate media and assistive technology specialist to upload the files into the shared folder on Dropbox so that I can download them. That means I may not even have to come into the office to get the books. But I do need to show the receipts to prove that I own the textbooks that I request in alternate formats, of course. The formats are either PDF or sometimes Kurzweil files. I also have the option of getting it in Word format, I think.

I print a list of textbooks that I’ll need for the semester off of the online system that we have. I bring it to the bookstore and I find somebody that can help me find the textbooks. I usually have a list. This semester, there were a lot of books. There were like nine textbooks for this semester.

I purchase the textbooks and I hold on to the receipt because I’ll need to show that to my alternate media specialist. Then I bring the receipt over to the alternate media guy and show him the receipt and a lot of times, if it’s a book that he already has in the system, perhaps, then he adds it to the Dropbox. Otherwise, sometimes he has to talk to the publishers to get the files, or

---

\(^1\) Dropbox is known to offer reliable and intuitive cloud storage that allows users to securely store and share files via private folder. Website: https://www.dropbox.com
in the worst case, sometimes they have to chop the book and actually scan each page. That only takes about a week.

I also use alternate media when it’s time for me to take one of my typical Electrical Engineering exams. There will be circuitries, diagrams, and graphical elements. I would use the enlarged printed copies that my alternate media specialist has created. I hand write the responses because sometimes those responses require me to draw a picture of an electronic circuit… and to show what the circuitry looks like.

**Assistive Technologies**

If it’s a PDF, I use Acrobat Reader and zoom in at 150% or 175%. If it’s a Word document, I can also do the same thing. I can zoom it in. When I open a PowerPoint presentation, I open it in Full-Screen mode and it’s usually already pretty big. If the files are in Kurzweil format, I can open it directly in Kurzweil and have it read to me.² If it’s a book, like a history book, or it’s just text, maybe a picture every twenty pages or something, I’ll probably use Kurzweil. But if it’s something like... I’m taking in a lecture in Magnetics class right now, and that’s got all these formulas and diagrams and all this stuff, Kurzweil can’t read any of that. For that I need to use the magnification. I’d say that I use Kurzweil maybe three to four times a week. I have a lot of reading this semester so I’ve been using it quite a bit lately.

Then on my iPhone… I use a lot of assistive technologies on my smartphone probably everyday. I’ll push the Microphone button and it allows me to dictate a text message. I speak the text message and the iPhone types it in. I tried learning JAWS but the amount of keyboard commands that come along with JAWS are extensive and a lot of the keyboard shortcuts are not

---

² Kurzweil 3000 and Kurzweil 1000 are educational software designed to support learners with reading, writing, and study tasks. In this instance, Mario utilizes Kurzweil mainly for its text-to-speech capability in which the software reads aloud passages of text. Website: https://www.kurzweiledu.com/products/products.html
intuitive.\textsuperscript{3} It’s tough. It’s not what you would think it would be and that kind of stuff. It was just too much so now I just zoom and it just takes me a little bit longer.

**Additional Academic Accommodations**

Also, I get extra time for tests and a private test taking room, which really, really helps because taking exams with forty other people in the room, there’s a lot of distractions around. When you’re in these private rooms, it quiets your mind and you’re able to concentrate. So it’s really nice. It’s just a helpful place to focus my mind.

I have been offered a note taker to take notes for me since I can’t necessarily see a lot of the stuff that they’re writing up on the white board.\textsuperscript{4}

**Interaction with Faculty Members**

I usually work with the disability management advisors to make sure my instructors are informed of my documented disability. A lot of times, I send an email actually before the class even starts. I will try to find the professor’s email and send them an email before class even starts just to let them know that I will be looking for them to give them the disability paperwork and all that and introduce myself.

A lot of the professors, though they honestly haven’t had a blind student a lot of times, and so they’re not quite sure what to do, so it’s really a learning experience for them as well. If for example, if something wasn’t accessible, you know, I couldn’t read it with my accessibility software but I was trying to, I would let them know. “Could you put it up there in a different format?” or something like that. I have asked that before. Here at this university, I’ve always had

\textsuperscript{3} Job Access With Speech (JAWS) is a screen reader designed for Windows computer users with vision loss. JAWS screen reader provides comprehensive speech and Braille outputs. Website: http://www.freedomscientific.com/Products/Blindness/JAWS

\textsuperscript{4} Some of the courses that Mario took were in hybrid mode, which typically includes both in-class lectures and online activities. Mario’s exams would be scheduled and proctored at Testing Accommodation facilities at the office of the Disability Services for Students department.
really fair professors in that sense. I’d say professors try to do everything they can to help. They always come up to me at the beginning of class and say, “Feel free to contact me if anything comes up, okay? You have my email address.”

**Navigating Online Learning Environments**

I’ve taken courses that were built in Moodle. These courses were mainly general education (GE) tech classes and other GE courses like there was a philosophy classes, a nursing class, and a math class. I sometimes get materials from my professor’s websites. Specifically my Electrical Engineering professors like to make websites and they post lab reports that we need to download, lecture notes that we can download, all sorts of online resources.

I think that ultimately, the Moodle system could be a very useful tool. It has great potential for things like posting lecture notes, posting test reviews, posting other types of resources that the professor might see useful to the course and we can all submit our assignments so that the professor doesn’t have to deal with a hundred people handing him papers in class. All submissions can just all arrive to his inbox… That type of thing.

I find that the menus on Moodle are appropriate for what they should be. When you click on them it takes you to what it should be. I’ve found that in that sense it’s been pretty good. While I’m browsing, I’m sometimes using the Zoom feature with Google Chrome that I talked about. I sometimes use that, but otherwise I’m just using the small bit of sight that I do have. The only thing that I would comment on is the text could be a little bit larger. Because links inside of links inside of links... For instance, that link might have really small text. I bet even some sighted people would have trouble reading some of that stuff. Sometimes it’s just a pain in the

---

5 Moodle is a popular open-source platform designed to facilitate online and hybrid courses. Since 2001, Moodle has been widely implemented as online content management system at many businesses, colleges, and universities around the world. Website: https://moodle.com/moodle-lms/

6 Mario describes the structural element of the nested menu under the “NAVIGATION” tab in typical online courses built with Moodle content management system.
butt having to go and find the Zoom and the little zoom slider and zoom in this far and then zoom it back out and having to go back and forth between that if it’s a really small text page. So, maybe increase the font size a little bit.

Speaking of font sizes on Moodle… it’s also difficult to go through the process of submitting an assignment—a Word document I’ve created or an essay I’ve written, or whatever. On Moodle, the text on the button’s label, all of a sudden, gets even smaller, really. It is very hard to see and difficult to navigate. Yeah, I definitely wanted to mention that because it’s taken me a while to upload assignments on Moodle just because it’s hard to find things.

In one of the courses I’m taking, some of the external links posted on the professor’s website were a little bit difficult to access, but because they are external links so we can’t really do anything about that. These are links to videos and what not and the descriptions for some of the videos were a little bit small. It’s like everybody’s goal is to make things smaller and smaller and I’m still out here, “I need things bigger!” Sometimes when I copy and paste the text from the documents that my professors posted into Word because I want to edit it or whatever… I’d notice that the font is eleven and a half or something. And I’m like “Come on, you can’t even make it twelve at least?” Fourteen would be better. It’s just easier for people to see.

I don’t really use the library’s website. I found their website kinda confusing to be honest. Maybe it’s just I’m an engineer and that’s just a different… book and… I don’t know. The whole process of finding books is more complicated than I thought. Who knows? Who knows? That may have just been my own stupidity.

I use Google when I need to find additional information for my assignments. Though you have to be really careful about what sources you use. Don’t get me wrong, I know that. But, if you’re coming from a credible source that you got from Google, who cares that you got it from
Google? If you find a credible source, if it’s a newspaper article, something factual, something really factual, that could be a good reason.

**Accessing Online Course Materials**

Sometimes there is a set schedule for contents to be posted. But mostly they’re erratic, really. Because most professors are kinda erratic and don’t necessarily keep to a schedule. It’s like, “I can say that I’ll cover this material in this week, but I may only cover half of it or I may go three weeks ahead of that.” Typically, I would log in once a day or once every few days to check to see if the professor has posted lecture notes so that I could download them because I like to have the files available on my computer. This is necessary because the reading takes me forever. Being visually impaired, it just takes me a long time. Like, this semester I’ve had to read whole books. Not just a couple of chapters, but whole books. Like 300-page books. That will take me days and days and days. It really will.

PDF is a very common file format. A PDF document does not guarantee that your screen reader might be able to read it and there’s no guarantee that the little screen-reading feature that’s built into Adobe Reader will also be able to read it. I’ve never been able to get that to work, for example. I would say I prefer Word format as my course materials. Some professors, I think, made a document in Word and they just don’t feel like converting it into a PDF file so they just post it as a Word file. Most of them create files in PDF format and send it out that way.

**Final Thoughts**

In my classes, I’d say my professors try to do everything they can to provide me with equal access to learning contents and learning activities as other students. But, I could see where some classes you wouldn’t. Maybe if I was taking an art class where I had to literally draw
something, which would not be pretty. But, not being able to see I might not be able to draw quite as well. So, I could see that, but not really in my classes.

I just find that more often than not my professors just have no clue how to use Moodle and they’re not willing to learn for the most part. That’s where I think the barrier is. For the most part, my compliments to the disability services office at this university because they have really done an exceptional job at taking care of me and making everything accessible for me and I greatly appreciate that.

**Hannah’s Story**

Several times a week, I would wave and exchange a “Hey, how are you?” in quiet voice with Hannah as I rush across the floor of the university’s 24-hour computer lab after a meeting to my office around the corner for the next student appointment. Hannah usually puts on her headphone while sitting in front of a computer workstation and she would be shifting through layers of textbook chapters and peer-reviewed articles. Each time Hannah asked if I had a minute to answer a quick question and I stopped by her desk, she would have Kurzweil opened on one side of the screen and Microsoft Word on the other while several web browser windows pointing to the university’s library website or her online class homepage running in the background. Hannah is a busy student.

Aspiring to a career in counseling, Hannah transfers from a local junior college to our university to pursue her major in Psychology and minor in American Multicultural Studies. When we met up to record the interview sessions, Hannah just finished her Spring 2015 semester the week before. As we were walking to the university’s library, Hannah told me she was one semester away from graduating with her bachelor’s degree. “Yeah, it’s going to be my last semester and I only have two to three classes left.” Hannah was also excited about her travel
plans for the summer as we chatted for a minute while I was preparing my laptop and recording devices before the interview session began.

Disability

I was struggling for a really long time. Even in high school and the first 2 years of college, I just I was barely passing my classes, struggling just to because I didn’t understand… Just my process of how I read and write is different than other students. It was really, really challenging.

I don’t know the exact title but I know... like I skip words when I read. And then the other thing is, it takes me a while to process information. I don’t process it really fast. It takes me a good while. I believe there are two main things. I think it was during my second semester at the JC (junior college) one of my instructors… she noticed some things I did really well and some things I didn’t do very well. So she was trying to understand what was going on with me, and she was the one that actually referred me to the disability resources at the JC. And then they tested me. It was a pretty long test… by a psychologist. It was about four and a half, five years ago...


Then, the other thing is also with my writing. She noticed ... How can I explain it? Like certain parts of grammar and some fractions … I was having a hard time. But other tasks, like certain parts of memorization I did really well, but other parts I will just... That’s why I really like the speaking out loud. The ... text-to-speech, I like that a lot, that’s why.

Alternate Media

I use alternate media for all of my classes. There is an online form that I would fill out and submit to Alternate Media office … then they would convert the materials into Kurzweil for me. I have been pretty lucky because I’ve been able to do it in the summertime … a month or
more ahead of time. I have to do it way in advance. I’ve had times where I did not do it way in advance because a teacher forgot a book or two books. It takes … it actually takes a whole month for the alternate format process to complete.

Some class I have textbooks and then some classes I don’t have books but they do have … like I know one of my teachers doesn’t like giving out books because he believes they’re too expensive. But he’ll copy the pages or certain things that he needs and he’ll put them together as a course reader in printed format and then the Alternate Media office would convert it into Kurzweil or PDF for me. But the process of was a lot and sometimes I wished the teachers would … because what happened … in my experience was just like… so the teachers don’t think about us students. They should have a digital copy, a ... PDF file and a printed one for some students, because then it takes about a week or two weeks to do the conversion. Let’s say that if I give you the printed version and it takes you … it may take you a day or two and then I’ve gone through a whole week of class without my materials. And then the next week I get my materials back. So I’m actually now two weeks behind. So then I have to play catch-up.

**Assistive Technology**

I started using Kurzweil when I transferred here about two years ago. At first, because it was a new program, I didn’t like it. But now I really love it because I’m used to it and I know how to use it and it’s been a really great tool. I’ve had Kurzweil for about two years now and Read and Write Gold (R&W), I’ve learned for about four years.  

And I also use Dragon since about a year ago because the JC recommended that I should start using it and since I’ve been using Kurzweil, I like Kurzweil a little bit more because I get to listen and it does almost everything what I need what Dragon does. I don’t use Dragon too often.

---

7 Similar to Kurzweil, Read & Write Gold offers a wide range of customizable literacy tools to support learners with their reading, writing, and language learning tasks.  
Website: https://www.texthelp.com/en-us/products/read-and-write-family
I have Dragon at home, I’ll dictate it sometime and then I’ll use Kurzweil to proofread... 8 When I take my exams, I read the questions with NaturalReader.9 When I respond, I type it or dictate it and then I use text-to-speech to proofread my answers.

I haven’t had a class that I haven’t used assistive technologies for because I use the tools for papers, research, or a test. And even if I didn’t have a test I still would use the highlight features on the text that I study. Yeah, so... I would probably say I rely 100% on Kurzweil to read because I will try to read it on my own first, and so you get a sense … but then I definitely go text-to-speech because then it’s frustrating. I have such a hard time where even just daily stuff when I look up Internet stuff… I still use text-to-speech because I don’t read everything.

I do have classes where they do provide us extra materials or we have to download, and I still have a hard time. I can download them fine, but to access them is the hard part because some of them are not even PDF files. Some of them are totally different so it’s hard to access them then it’s hard to read them. So then I have to convert them to a PDF file… or text-to-speech so I can actually read...10

The frustrating part is the teacher doesn’t download them correctly or doesn’t put them in correctly so then I have to come to you and say, “Jack, help me!” So that part, yeah.

**Additional Academic Accommodations**

So when I ... as an example, when I read, I don’t actually read everything on a piece of

---

8 Dragon NaturallySpeaking is a versatile speech recognition software that enables users to dictate and format documents as well as to navigate and perform tasks within a variety of computer applications using voice commands without the need for mouse and keyboard inputs. While Dragon also offers text-to-speech capability, the feature is not as comprehensive as other dedicated application such as Kurzweil and Read & Write Gold.
Website: http://www.nuance.com/dragon/index.htm

9 NaturalReader is a basic text-to-speech software offers natural sounding voices. The free version of NaturalReader is used during accommodated exams in which the instructors specifically request with the office of Disability Services for Students to not provide additional tools such as dictionary, thesaurus, etc.
Website: http://www.naturalreaders.com

10 Hannah explains the process in which she uses applications with optical character recognition (OCR) features such as Adobe Acrobat Pro or Kurzweil to convert an image-based PDF into a text-based (searchable) PDF. This process is necessary for the text-to-speech application to read the documents aloud to Hannah.
paper. I will skim for some reason. I will read some parts and I won’t read other parts. I’m not sure if I don’t see them or I don’t recognize them, something, where I’m skipping them. Then the other thing is during lectures, I don’t always hear things correctly. So I need to hear them over and over and over... And that’s why, sometimes having a note taker or a recorder helps me so I can listen to it over and over because the first time I miss a lot of my processing.

I also get extra time on tests because it takes me a little bit longer to process. I’ll know the answer but it will take me a while just to articulate and put my thoughts down on a piece of paper or to get it on to the computer. I use NaturalReader to proofread and ... to make sure that I have what I wrote, what I think what I wrote for the answers. That part I love because I can catch a lot of my mistakes. That’s really important to me.

**Interaction with Faculty Members**

I usually talk to my disability management advisor and he has a form that tells my instructors about my disability and then I usually will go, either if it’s the first day of class or the second day. Sometimes instead of doing it in class I go see the instructors in person.  

I’ve had some instructors that know the program really well. It made it so much easier. That was really helpful. We were set because I remember one instructor asked us to bring our laptops or computer that day. We were working in pairs. He just wanted to make sure we all knew how to look stuff up. He was very clear on, “This week, this is what you’re going to learn. Next week, you’re going to learn this. You’re going to do this.” We would come to class and be able to spend 5 or 10 minutes reviewing last week’s work with the Moodle. So if you got a little bit lost, we can ask. We could also ask questions.

Some other instructors don’t know how to help with online course’s issues. They’ll say,

---

11 Similar to Mario’s experience, Hannah enrolled in several courses conducted in hybrid mode, which typically include both in-class lectures and online activities.
“Well, I’m sorry. You should figure it out on your own.” And I’ve had instructors who won’t … Like, I’ll send them emails and say, “I can’t read this. I’m having a hard time when I print it out.” And then I remember getting an email saying, “Well, this is the name of the book, and you can get the book instead...” And I was like, “Oh, okay.” But I’d just have to figure it out on my own … with the help from the office of Disability Services for Students.

For me, the librarian has been a tremendous help. I think the first semester I was here, I didn’t know how to do ... I had a research project to do. I didn’t know how to do it. She was so helpful. She spent a good hour, 2 hours, slowly teaching me how to actually navigate the library webpage because it was totally different from the webpage I was used to at the JC. The librarian actually showed me, “This is how you look up for books. This is how you ... “I mean she really showed me step-by-step. Then she also asked me ... She taught me how to do it and then she asked, just to make sure I knew how to do it. I had to show her. Oh my God, she was amazing.

Then she also showed me how to look up to find articles. She also showed me how I can email to myself. Then also she showed me how to save them on the Desktop. A lot of those research files, what I would do, which I’ve done, is then I would save them on my email. Then I could download them and then I convert them to Kurzweil. Then I save them on Kurzweil so I could listen to them and annotate to them. Then I save them on my Dropbox.

**Navigating Online Learning Environments**

Sometimes the course syllabus information would be changed. This happened to me this semester. He would change an assignment’s due date. It was just frustrating because I would go back and forth. Okay, this is not due. This is due. It was really confusing.

What I had problem with was some of the materials that he uploaded were really hard to find because he didn’t properly load them up correctly. Some even weren’t PDF. There were
videos that I didn’t know how to open... I remember there was supposed to be a TED Talk video and a something else video. I can only open one video, but I couldn’t open another video. The link didn’t work. Then I had to go on my own and try to figure out how to open the file. Some part he did really well and other it was really challenging and frustrating.

Then the other thing was when you go up to the home page, you have it says your course, like Physic or Math. It just has the number, your class number. It would be like “Psych 403”. It wouldn’t say “Research Method”. It would just have the number and I would have 4 classes. Then I’d go back and be like, “What was this class?” If it was a title, I think it would be better.

Also … I know for me finding our teacher’s hours, availability, or just something basic … that was hard. Their e-mail on the website, because I would want to email my teacher a lot. It was hard to find on the Moodle page because it was ... I’m trying to think now. The layout format of the menu on the left hand side … Oh the other thing I had a hard time was the small print, the small font. I would always enlarge it because I found it small … Other students said it was fine, but I would always make mine bigger. It was just easier to read because the small print … I still would look really close at the screen.  

**Accessing Online Course Materials**

Sometimes ... instructors either put reading assignments on Moodle or they’ll put it on their homepage and the files on their homepage are different than the Moodle. And it’s hard to access. I’ll give you an example. Like, this is what happened last semester in one of my classes, I remember. She had several different newspaper articles or other materials that she’s gotten somewhere else that’s three or four pages. And she doesn’t have a book, just extra... articles.

---

12 Hannah experienced difficulties navigating because of the lack of intuitiveness such as the way links and buttons were labeled and categorized as well as specific issues such as small font size in the menu of her online courses. This instance is similar to what previously described in Mario’s narrative when he talked about the structural elements found in components such as the nested menu under the “NAVIGATION” tab of a typical online course built with Moodle content management system.
Sometimes the files are so blurry. Like, you can’t even distinguish the word itself. You can’t even see the words. And I have good vision. That’s the problem and it became much more complicated than my capability to edit and to read these files. I’ve had this issue more than one time. And it makes it frustrating because I’m supposed to be catching up with these assignments to read and they’re like ten pages or eleven pages. And I want to read it because we’ll have some kind of discussion or quiz on it for our next classes. So it’s ... I don’t know. I know I’m not responsible, but I feel like it’s something I should know how to do but I don’t know how to do it, because I just want to read the materials ... just to get something basic. So it makes it frustrating.

I remember for our Psychosomatics class, you had a lot of articles and library website. Some were okay because I had to ask my friends to help me open them. I couldn’t open them on my own. Some links were easy to open and other links ... I didn’t know where to go because I wasn’t that fast enough to look. For some reason, the research articles that she already uploaded weren’t PDF files. It was a link... to a web page. I didn’t know and I was still learning ... I was still new to the technology. Just learning how to open the web page, it took me a little while. Once I learned it, I was okay. There is that. I opened the files in Kurzweil and read them. Actually, some work out and some don’t because some ... because I remember coming to you because there were 2 or 3 I didn’t know how to convert. I was at the 24-hour lab. I didn’t know how to convert. You did something to convert it to a PDF file for me because it wasn’t originally a PDF. I do remember that because I spent a long time trying to convert it on my own.

PowerPoint is what I’ve had a really hard time converting it to Kurzweil. That’s been a challenge. Those are iffy because sometimes they work and sometimes they don’t work.

We see a lot of TED Talks¹³ and YouTube videos. Sometimes the link comes up right

---

¹³ Hannah refers to the series of educational videos published by TED (Technology, Entertainment and Design) through their online platform at https://www.ted.com.
away and it works. Sometimes the links … what will happen is the page will come up, but the audio doesn’t work. Also, it just depends on the video itself.

**Final Thoughts**

I would like to say from my experience, I mean, I like online but I have a hard time with it. I would say I did not receive equal access to the learning contents… It’s not an equal basis when someone like me is not an efficient reader or can’t hear things as quick or grasp as fast as someone else. My friends say, “Oh I love online classes. I can do it easily. I have no issues with it.” I’m like, “What?”

So, accessibility becomes really important to me. Text-to-speech enables me to access the materials … or having you guys even though I’m pretty good about dealing with some of the materials and with the tools I’ve leaned how to use. I don’t mind doing the work. So it’s not about the work. It’s more about this accessing the contents. I don’t think the online learning environment was designed to accommodate my learning style. A lot of it I had to really try to figure it out or bug you guys because if I was all on … I was originally all on my own. I was still having a hard time. I didn’t know what to do. A lot of the issues that I was having I think could be better. It becomes a little bit more frustrating when teachers are not listing the books … they’re not even giving us the students the information when we ask ahead of time. And sometimes teachers in the last minute will add something… So then it takes extra time. So I wish they would somehow figure out their materials ahead of time …

So what I would like to add … is to think about the students with disabilities, about accessibility because it gets frustrating just trying to catch up… Some teachers are great. And some others, they still lag behind. And you’ve been so patient with me. So thank you, for that. I have come to you. So … thank you for being really, really helpful.
Ella’s Story

During the last few months of 2015, major news outlets in the country have been delivering reports on politician’s poll numbers and debate performances virtually nonstop. While working on Ella’s narrative, I could not help making the assumption that Ella would make an excellent campaign manager for a politician running for office. She possesses the ability to plan and organize her workflow to the last detail and follows through with each phase of the process. She is also ready for surprises, too. Often times, if Ella stops by my office in early May, I know we are talking about her plans for the Fall semester which begins in mid to late August.

When we met for the interview sessions of this project, Ella just finished her last semester and earned her bachelor’s degree in History. She is now planning to complete the required exams and the application to join the credential program for single-subject high school teacher.

Disability

I have Hemochromatosis, which is a blood disorder, which affects my memory, any part of any major organ. The iron accumulates into my body in the heart, lungs, brain, and it causes other issues so, because of those I also have Macrocytosis, which is a big red blood cells, compared to regular people’s blood cells. It was 2005 when they found the Hemochromatosis, and then the rest of it kind of piled on.

When I was first diagnosed in 2005, it was once a week, they would take a pint of blood for a six-week period of time. I would have a week off and then they’d do it again. I went through that for over 2-1/2 years. Now, it’s less so, it’s about a once a month situation now so it doesn’t affect me near as much as it did but it still does affect me.

One of the other issues that happens with this is I get migraines. The migraines, I can usually tell when they’re coming. I can see these little dots … or different things that let me
know they’re coming. One of the ways I’ve tried to counter that is to try to load up all my school schedules onto two days or three days. I have four days of chance for migraine is less so on the days that I’m coming to school.

I also have a slight reading disability with comprehension. Those issues all combined make it very difficult for me to study as a normal person would. Instead of taking two hours of homework for every hour of classroom, it takes me approximately four hours of homework to every one hour of classroom. Part of that is because of reading. Once I read I don’t remember what I’ve read. I have to take notes. I also have to record a lot of the lectures, which I then have to go back and re-listen to, or transcribe, which even takes longer. For me, reading twenty pages of any document takes me about two hours. Which a normal person, it probably takes thirty, forty minutes. It’s a lot longer, and then as I go I have to highlight, take notes, so that I remember. When I don’t remember what the document is the next day. I actually have to go back into the document or my notes to be able to converse in class about this document, because I can’t remember what I’ve read. In Kurzweil, I’m able to look at the notes or the highlighting that I’ve made, too, so that I can be involved in the conversation in our class.

When I’m writing, I write and then my mind can’t remember the words I want to use, so I have to do research on the wording. For me, taking a full load for twelve units is really an 80-hour workweek. Basically my husband says goodbye to me at the beginning of the semester, and I see him again at the end.

**Alternate Media**

When the reading materials are available in accessible digital format, it makes it a lot easier to be able to read along with it so that I can hear what they’re saying, but really know what the wording is saying. That’s very helpful. I’ve had some instructors even put reading materials
into a booklet form that is produced down the street as a course reader which is also available via a disk or a thumb drive so that it’s available to the Alt Media department. That again, is me getting ahead of the game and for most disabled students, I think that just the challenge of coming to school is more than they expect.

Also, with the help from my husband, we try to buy used books that are in good condition that have very little highlighting because I know the spines are going to be ripped off of them, so I try not to take a brand new copy and do that. As school starts the prices go up. I’m able to get those books at a quicker and cheaper price. I also am able to take books and deliver them to the Alt Media department if needed. I actually have my books, for the most part, before school starts so that I can actually start reading them and getting an idea of what’s going on. They’re very helpful in that department.

**Assistive Technology**

I was first introduced to Kurzweil at the junior college. The issue that I had with that was I had to go through a training program on how to use it which was great. However, I couldn’t remember anything after the program got done. They expected us to download our books and then have them read to us, and we had to cut and paste and do the things that the Alternate Media department here does for you. It was very ... it’s hard enough going to school but to try to learn to do that on top of it? It was very difficult. I tried it for one full year, when I was at the college and then I quit using the program and then I only utilized the extra testing services for time. I moved here and found that you guys had a much better program. I tried again. I came in with hopeful ambitions and was not disappointed.

---

14 A common practice in which instructors compile a selection of book chapters, peer-reviewed articles, and other forms of publication to create a course reader. In a number of cases, pages in a course reader are photocopied or scanned without proper quality control resulting in poor quality. The process to make reading materials may take up to three weeks or more depending on the workload undertaken by the Alternate Media office.
I have an iPad. I use Kurzweil on the iPad. The iPad app is called “firefly” doesn’t allow me to do as much as a computer-based Kurzweil program. I am able to read. I’m able to change the voice. I’m able to highlight things in that app. In firefly, you can highlight words you weren’t able to before and they update the app to have better voices. I’m more limited on what I can do. I do have access to computers at the school, but I have found that those ... to use the program at the school is clumsy and difficult because there aren’t enough computers to go around with as many students as there are. They freeze up and things like that. Whereas, with the iPad, I still get some freezing issues on occasion, but I can close out the program and restart it.

That program’s helpful because not only does it read to me but I can follow along. Highlighting the book as I go is very helpful but it’s also very time-consuming. Sometimes the wording isn’t always as correct as it should be. They might read the word “read” R-E-A-D as “read” R-E-D instead of “read.”

I also use an iPad app called Read2Go\(^\text{15}\) to read DAISY books.\(^\text{16}\) Their program is becoming better because the book choices are getting larger. They’re certain things about the Firefly app and the Read2Go app that are different and I like different things about different programs so that makes it difficult. I can’t combine what I need ... I actually use the two programs in conjunction with the actual book. They are getting better. I don’t use them for writing. I, at one point, had tried doing a Dragon program where I spoke into it and then it typed. It didn’t go well. It didn’t recognize certain terms or wording. It does take some training but sometimes that, in itself, was too cumbersome. I don’t have the time to train this thing how to

---

\(^\text{15}\) Read2Go is a paid iPad app designed for Bookshare (www.bookshare.org) users. The app allows users to browse, download, and read a large selection of books available in accessible DAISY formats. Website: http://read2go.org

\(^\text{16}\) DAISY is the acronym of Digital Accessible Information System, an accessible publishing standard that has been widely developed and accepted worldwide. The DAISY publishing tools and software are available freely to all developers and users. Website: http://www.daisy.org
work properly. I actually ... I type pretty well because I took a typing class in high school. When I write I actually use my iPad. I have a keyboard that comes with it, and I’m able to open pages and I’m able to write an entire book report on it. In fact, I wrote my senior thesis on my iPad.

I proofread backwards. I read the words backwards, so that I can see if I’m missing some words or see if I’m missing some columns or dots. When I edit it, and then I have family members that actually read my papers for me. My brother reads for me. My aunt and uncle read for me. My husband reads for me. They usually find clunky sentences or paragraphs that maybe should be moved down a little. Yeah, you can’t train software to do that.

**Additional Academic Accommodations**

I’m authorized to have extra time for testing. For example, if there’s a two-hour written test in a history class, I have three hours in a quiet study room to be able to complete that test so that helps because it takes me longer to write and think and recall. For the most part I can be in a room with other people, but if it’s real noisy I will ask for a different room. I wear earplugs when I take my tests so that it helps me focus on what I’m doing.

I did run into a slight issue over the past semester, not this semester, the prior semester, where they didn’t … It was an open-book test, and because my iPad can be connected to the internet they didn’t want me to have my book open, and so I was unable to have my iPad in there at the time. I did have my physical book with me, just in case, but it made it more difficult because all of my highlighting was on my iPad. All my additional notes, all my highlighting and everything were in there. I actually brought it up to the department as an issue, and they said that that wouldn’t be an issue for me, but I don’t know if it’s an issue for other people. I have the trust-based thing going on with the DSS, so they know that I’m not going to use it to Google

---

17 Disability Services for Students
things that I need to find, it’s an open-book test. I’m just trying to use the book and my notes, but that did become an issue. I don’t know if that’s an issue now, for other students. If we have these books available on the computer, and we’re trying to use them, and it’s an open-book test, that makes it very difficult for the disability department. I understand that, because you can’t watch everybody all the time, and you know what they’re doing, and this and that.

I still passed the test, but it was much more difficult having to do it on an open-book test that I hadn’t read or taken notes on. Not knowing, but me being somebody that thinks ahead, I actually had gone through my iPad and my notes for that particular book, and anything that I felt was important I actually wrote in the margins for my open-book test, but not everybody is like me, and most people don’t plan ahead. I actually thought that that might be an issue, and so I went ahead and found that that was an issue.

The other issue I had with the accommodations was, I was in the middle of taking the test, and you know how it just takes you a while to get going. Then, once you get going you’re focused, … and the fire alarm went off. Okay, so everybody had to leave. We had to leave, and so when we came back in our time started again, and they did actually extend our release times a little bit longer, but by then I had already lost my mojo, my thought process; everything. I think in that case, they should’ve given us an option of ending the test, and telling the instructor we needed a new test or something like that, because … I can understand how I can’t come back and retake this test, because I already know what’s on it, but maybe to come back and take a different test would’ve been better, at least for me. I don’t know about how it affected the other students, but that’s how it affected me. I wasn’t that far in to the test when it started, but I’d already gotten my focus and I’m writing my essays. It made it more difficult to get back into that. It would’ve
just been nice to have an option of, “Okay, your test has been interrupted, how do you feel about continuing, or would you like to reschedule and take a different test?”

Another accommodation that’s provided to me is priority registration. I usually get a day earlier. As of yet, because of the early registration I’ve been able to register for the classes that I need and want. I’m also the type of person that has my ducks in a row. I research everything. I know what classes I want. If this class doesn’t coincide with this schedule, then I change it to coincide with this schedule, and I have alternate schedules so if one won’t work the other one will. I’ve never really run into that issue because I’ve always been in preparation of those issues. Yeah, I always have a plan B except for the credential program, which they haven’t provided me.

**Interaction with Faculty Members**

Usually, to contact the instructors I first will email them stating that I’m a student with disabilities. I require all the information for the book or reading list prior to the class starting. I will also go and introduce myself to the instructors. After sending an email and try to get to know them that way, I will email them through the break or the, whether it be the summer break or the fall break. I will email them not so much bugging them, but reminding them that these are ... finals are over now and here’s what I would like. I would say I have an 80% success rate in getting my information early, the reading materials, the books … all that.

Some instructors I contact at the beginning of the semester or prior to the semester starting are very accommodating in providing me with the information that I need ahead of time on the required reading materials so that I can provide that to the Alt Media Department. That would give them (the Alternate Media office) a little bit more time to provide me with the written information into a reading program.

I was able to do all reading and writing on my iPad, which my instructor says, “You
cannot write on an iPad.” That was kind of funny, but she’s also the instructor that didn’t get me the books into the last minute. She was not very helpful this semester. Of all semesters, that was the one that I had the issues with.

**Navigating Online Learning Environments**

In my three or four previous semesters here, they have used Moodle, some to a more extent than others. Entering the web page, if you sign-in through your university website then getting into Moodle was actually pretty easy, but to get into Moodle from the main Moodle page, it didn’t allow me to use my university’s credential. I had to go through the university’s website to get on to Moodle, which was a real pain in the butt. Then there’s a button where you can click, “Moodle pages,” which will take you to Moodle pages. Then each of your instructors is actually separated, which was nice, but one of the problems that I had was each instructor sets it up differently. The format over on the right is general stuff, and then format on the left is some other information, but you may go to another website and it’s completely opposite. Surfing around was a little bit difficult.

One instructor may have it set up as, this is week one, this is week two, this is week three, okay, which was really good. I could click on week one, and I would see the additional readings that are available. However, I either have to download those, or I have to contact you, and have you download them some way so that I can get them into a digital format. Sometimes they have a few weeks in advance which … was helpful, but a lot of times it was … We would have class on Tuesday, and on Wednesday it’ll be there, and on Thursday you were expected to have it read. They don’t give you much time.

Other instructors will set it up where you can see the entire syllabus for the whole semester, so you know what’s due, you know what has to be read. That was very helpful
because… If I have, like say, four different books to read for that semester, and you were still trying to digitize them. I could say, “Hey, I only need this book to here, and this book to here to get me by through week six,” and then that put a little less pressure on you to get them done, so you could help other students that needed it as well. That was helpful. Some instructors put grades on their pages, while others had grades but they didn’t keep them updated at any time.

**Accessing Online Course Materials**

Some instructors are very good with Moodle and have it all laid out, and have it all figured out. The instructors that are there prepared, they actually have the link. All you got to do is click on the link; it takes you to where you need to go. Depending on access to that page, depends on whether or not it will lead to me or not, but for the most part it will not. Then I have to figure out how to download it, or figure out a way so that this department, the whole media department can access that page.

I had to actually go to the instructors and ask them to provide you with passcodes to get into their course material, because I’m not able to share it with you, and I’m not able to print it out and then provide it to you, because the document maybe too big or a part of the book, like before where I said you can only print the pages of the book. I’ve gone through those which were … I tried to get you access and then you go through and find the ones that I need and the order to converted into media format that I needed. Then you put it into a file for me to access, which can take anywhere from one day to three weeks, just depending on your schedule, how busy this office is and who needs what when.

I’ve taken some classes that required online learning and also required a reader, or the instructors will put the information up on Moodle. Occasionally they have their own web sites,
but they’re getting away from that, because the schools want them to get away from that. For the most part, they’re either using Moodle or they’re not using Moodle.

There may be a printed document that’s three or four pages long or up to twenty pages long and I need to read that prior to the next class, which is very difficult for me, because now I have to physically read it and I can’t have Kurzweil read to me. Also, the files are usually in PDF form, which make it even tougher for me because my iPad app does not allow me to put the PDF into the program, so it will read to me.\textsuperscript{18} I either have to come into school or have the Alternate Media office do it for me, which is what I usually do because I’m so buried with everything. I usually give the Alternate Media office the information that I need done, and I try to fill out the proper paperwork after that.

Some instructors would base everything off of the book list that they provided on day one of the class. For me, if I were able to get the book list early, then I was able to get you the books earlier. Some instructors had other things that they’d wanted you to read such as additional reading of articles, chapters in books, eBooks. Some instructors were really good at putting a link that took you right to the library page and takes you right to the eBook that you needed. Whereas others would give you just the information, and then you had to fight through going through the library site, trying to find it. Then if it was available on eBook, not all eBooks are available to be read to you. That was difficult, and not everybody can use this eBook at the same time. Which was a huge issue, because the instructor would say, “Oh, well, you don’t necessarily have to buy my book, because it’s available with the library on an eBook,” but only two or three students could use it at one time which made it very difficult as well, especially for somebody like me, who needs additional time to read -- Some of them were entire chapters, and so to try to print out

\textsuperscript{18} Ella describes her experience with image-based PDF files. This type of PDF files is not accessible because they are basically comprised of the images of the contents and thus are not useable by text-to-speech software.
40 pages was difficult. Also, eBooks only allow you to print out so many pages before they say, “Oh you can’t print out any more pages.”

I had a geography class that was very … She waited till the last minute to put everything, because she wanted to find the most recent articles and video available. Those actually weren’t so bad, because I was able to watch the video and listen to it at the same time. Though, there have been instructors that wanted you to maybe watch or listen maybe, like, a 60-Minute show, maybe not the entire show, but a portion of the show. The problem with that is you have all the commercials. Sometimes they’re YouTube videos, sometimes they’re through other media sites, sometimes through newspaper articles, sometimes through magazines, sometimes through places like 60-Minutes. That all just depends. For my benefit, to make it easier on me, and not having to deal with the buffering and the commercials, and the things that I needed that way, I actually downloaded the 60-Minute app, which allowed me to go back and look at that specific thing without the commercials, without the buffering, and it would just show up. That made it very helpful for me. Though I had to pay some money for that … Yeah, it was a one-time fee of like $5.99, so it wasn’t real expensive, but that’s just another cost…

Final Thoughts

There’s a lot of other issues that the instructors just don’t realize are happening. Some of the contents being posted online without students actually knowing about it, because when you register for these courses, it’s just a course, it has no indication that it’s online or hybrid. On occasion, it will say some homework required online or something like that, rarely will say that though. I was very surprised, like I took class at the JC that was just like what we’re explaining. I signed up for chemistry class and I had no idea that part of the homework was going to be required to be done online. One of the problems with that is the instructors don’t remind you that
you have homework due online. It’s you’re a college student, you’re supposed to know what’s expected of you and so very often I would forget to do that homework because it was part of the hybrid …

I have met people during my college career that I have stated, “Have you even looked into the disability department? Because they offer this, this, this and this, depending on the disability.” Many people say that they have never even heard of the disability department. I don’t think there’s enough awareness out there, because most people put the stigma with disability as “I can’t do it on my own.” Or, there’s a disabled person or handicapped or whatever the other terminology that is not necessarily good. We need to get rid of that stigma. Make these programs more aware to the students that need them. There were multiple students that could have used these programs during my college career that ... some took my advice and there’s ... just did it on their own. Even applying for positions, jobs, or they ask you if you have a disability. I’m hesitant to say yes. That number one, they shouldn’t need to know if I have a disability, but on the other side of that I might need some accommodations for disability. If you have a disability a lot of times they won’t even hire you, because you have a disability or you can’t do that one aspect of the job without any help. The stigma’s there and even for me, someone who’s high functioning, I’m afraid to tell anybody I’m disabled. I completely understand.

Sometimes it’s more work to live with disabilities in all aspects, whether you’re living with a disability and you’re trying to provide yourself with a home and a shelter, but also all these additional steps you have to take to prove you’re disabled. To prove that you own this book, to prove that ... these are very cumbersome steps and so somebody with a disability is actually at a huge disadvantage over regular students. That’s unfortunate because I think it should be a little bit easier for students with disabilities because we’re already dealing with
enough issues without having to jump through all these other hoops. I think if a little more communication between the instructors and the disability department or the departments as a whole … For what we have to work with I think you guys do an awesome job as far as the disability department. You guys make is easy I really like to see those forms changed … That I know they’ll helpful for you but I need a reminder if it needs to be done and so maybe at the beginning of the semester.

**Sophie’s Story**

I met Sophie in the late summer of 2014 when she was getting ready to transfer to the university as a junior after completing the course requirements at her hometown’s local community college. A year later in the Fall 2015 semester, Sophie is a college senior majoring in Psychology. More importantly, having just finished her Spring semester with a cumulative GPA of 3.95 and was named Dean’s list, Sophie is well on her way become a successful candidate of her master’s program in Vocational Rehabilitation Counseling. As an experienced screen reader user, Sophie spends up to five hours of in-depth study time a week on each chapter per class to make sure she knows the materials thoroughly. Sophie completes her reading task the same way for all three of her 4-credit courses on top of the workload made up of homework, exams and additional research assignments.

In June of 2015 when we met for interview sessions, Sophie’s schedule was even busier. It was the summer intersession at the university and while most of her fellow students were enjoying some time off or enrolled in one course, Sophie has been working on two upper division courses totaling seven semester units.

**Disability**

Since 2003, my permanent disability has been total blindness. It definitely is a lot more
time consuming to do research and navigation on the Internet. I have to go line through line to find what I’m looking for if I’m not familiar with the website. If I am, there are certain keyboard shortcuts. Other issues I have are sometimes buttons or links are not always accessible. The sites’ links are not always accessible with my JAWS screen reader. Meaning that specifically, when I go to click on a button or link, it is somehow blocked out to where I am unable to click on it, because when I do click on it, it doesn’t do anything.

I don’t have working eyesight to just scan with my eyes. I have to listen with my ears and go through every single thing to find my spot. I have to find my space. I have to look through my answer that I already wrote to make sure it pertains to the question I’m answering. I don’t have working eyesight to just scan with my eyes. I have to listen with my ears and go through every single thing to find my spot. That’s where it just gets really time consuming, is all the time I’m spending scrolling up and down the page, trying to find my spot, looking for what I need, make sure that I’m being efficient and accurate. That’s the sort of thing I’m up against when taking an essay exam and is why it is so important to me that I receive the double time accommodation.

**Alternate Media**

As far as reading accommodations for my classes, alternate media has really been helpful. I do prefer my books in Word document format. When I read, the use Ctrl + F keyboard shortcut,\(^{19}\) is handy to search for certain things but it can be time consuming, too. It’s not always convenient because I could end up having a long list of results if the searched term is something commonly used. Sometimes I’d rather just scroll through. That way, I get a chance to re-read, re-listen to what I’m studying. As far as the articles and assignments handouts, posted to the instructor’s pages, they really weren’t accessible at all. Most of them were PDF files that were

---

\(^{19}\) Keyboard combination to activate the “Search” or “Find” feature in applications running on Windows computers.
image based, meaning that they scanned a picture of the article or handout and posted it on there. I didn’t have very much luck with that unfortunately. When the files are not accessible and I have to go through someone else. I feel like I have to scramble because that’s time I’m missing out on, being able to complete assignment. That stresses me out because I have to work harder at the last minute to get it done.

Sometimes, I do have difficulty in Microsoft Word. I don’t know if there’s a way to insert headings where I can jump to headings or make my own marking of headings. I just scroll through. For me, it’s the most convenient because if JAWS pronounces a word I’m not familiar with, I can just go through and see how it’s spelled and understand. From my own perspective, I can take initiative to explore or to understand, to make it work for me. That’s why I prefer that. I know there are other formats, such as DAISY format, putting it on Rich Text Format (RTF) and putting it on my Victor Reader Stream.

Like I said, there’s typically a lot of room for error by just listening, therefore I appreciate being able to utilize all aspects and functions of word documents ... I’m very detailed and accurate, and I appreciate knowing that I’m saying something correctly or spelling it correctly. I like to have that Word document of the text where, if I need to, I can spell it out and get that idea, the whole idea.

The one thing I did notice is in my DSM-5 text, the headings were extremely helpful, because every time I would read through the listed mental disorders and symptomology, having

---

20 Rich Text Format (RTF) is a document format developed by Microsoft Corporation to facilitate text and graphical elements across devices and operating systems. Website: https://support.microsoft.com/en-us/kb/86999

21 Victor Reader Stream is a hand-held multimedia player with key describer which announces the feature of each key. It is designed specifically for users with visual impairments and blindness conditions to access contents from a variety of libraries such as iTunes, Bookshare, Learning Ally, and the Library of Congress. Website: http://victorreaderstream.com

the headings labeled helped me to identify when I was coming to a new mental disorder... It’s a list of the different diagnosis, so whenever I got to a new topic of diagnoses, it said “heading.” While I’m scrolling through all of them, because it’s just this long old list and list of give or take about 50 pages of mental disorders ... which I could use Ctrl + F, but also … within the chapter on anxiety disorders for example, there’s so many different mental disorders that include the word “anxiety” therefore making it inconvenient to use the Ctrl + F shortcut command. When I’m scrolling through and it says “heading,” I know to stop and look at that. It’s a really nice marker for me. Yeah. That’s where it’s really helpful, I’ve noticed.

**Assistive Technology**

I use JAWS. I started working with JAWS in 2004. However, it was not consistent. I took a class right after I lost my eyesight. I started trying to get familiar with adaptive technology then. I didn’t have the program for my own personal computer use, so I was only using that at the local community college. Although I started using it and training with it, I didn’t use it consistently until 2009. From 2009 to now, I’ve been using it consistently. Yeah, very frequently.

I attended the Orientation Center for the Blind in Albany, California. There I received my basic training skills. That’s where I learned my mobility, my braille, computer, and adaptive technology with the Victor Reader, and other things.

I also use OpenBook.\(^{23}\) I have an Eye-Pal SOLO,\(^{24}\) which is ... It has this little flatbed where you put your paper on, and then the camera hangs over it. I put my paper on there, and it

---

\(^{23}\) OpenBook is a software designed to convert printed and image-based documents into searchable text-based documents using its built-in optical character recognition (OCR) capability.

\(^{24}\) Eye-Pal SOLO is a stand-alone camera-based hardware designed for users with visual impairments and blindness conditions. The device enables users to scan printed materials such as books, newspapers, or mails and use the optical character recognition capability to read texts aloud and save documents in text or MP3 formats. Website: http://www.freedomscientific.com/Content/Documents/Manuals/Eye-Pal/Eye-Pal-SOLO-Quick-Start.pdf
senses the paper. It scans it, and then it reads it back to me. That’s pretty convenient for something quick I need read to me. Also, when my OpenBook isn’t working that great, then I will throw my paper on there and see if that can do any better.

I use my Victor Reader Stream for recording class lectures, so I use it pretty much every day. As far as putting my books on there, not often, unless I’m traveling, because it’s more convenient to just throw in my pocket or my purse. It’s easier to carry on me and be able to listen to my books for homework in that way. It’s not very efficient, but it is a little more convenient when I’m traveling.

For computer training, I go through the Earle Baum Center for the Blind. It’s here in town. My old laptop, I was still running XP. The computer I received, from my understanding, they tried to get me set up with Windows 7 back in 2009. However, the computer, when they set up Windows 7, somehow it had an issue where it turned off the USB ports, which I needed for my printer. I think they said it was something with the BIOS25 that they couldn’t figure out or fix or something. I had to stay with Windows XP.

I am recently switching over from Windows XP to Windows 8 operating system, so it is completely different for me. I feel like it’s an in-between thing. Windows 7 is between XP and what I’ve experienced with Windows 8. I’m not 100 percent afraid to poke around, so I will definitely poke around in the Ribbons, see what I can figure out myself. With Windows 7, I feel like I know enough to get me by. My default, when I don’t have anyone to help teach me, I rely on someone sighted, which is not ideal, because there’s not always going to be someone who can run to my rescue. That’s how I manage my stuff. Yeah, I am still learning that, and so I am currently getting some computer training, learning that operating system.

25 BIOS or Basic Output Input System is a small software program running separate form Windows. Aside from booting up the operating system, BIOS identifies and configures hardware such as memory, hard drive, optical drive, etc. Website: http://windows.microsoft.com/en-us/windows/bios-faq
I’m hoping to be able to get more familiar with other things I’m not 100% on, such as PDFs and, let’s see, what else? Mainly that. Some other quick tools, and the Ribbons\textsuperscript{26}… figuring out all my shortcuts, because it’s so different. A lot of it is the same, but a lot of the settings and tools that I need to turn in an accurate paper and to be able to do my research quick and efficient, I need to relearn for the new operating system. I am still working with that. That’s really nice to have. As far as computer and technology, that’s it.

\textbf{Additional Academic Accommodations}

I originally received time and a half for my testing accommodations, but when I write an essay, I’ve asked for 100 percent. I understand I’m a slow writer, but also I like to be very thorough. I think my GPA says that for me. The exams would be scheduled in advanced so that the instructors would submit the exams and instructions to the DSS office via their online system and I would take my exams at the DSS office. As soon as I register for my classes, I know that I’m in class, I email the instructor and let them know that I have a verified disability, that I’m a client of Disability Services for Students.

I also request for the list of textbooks they will be using so that I can get that into the Alternate Media Center to be converted. Basically, that’s it. The email I send is a template supplied by the disability office that is a quick-to-the-point explanation of me needing my materials in an alternate format. Then the instructor responds and provides me with a list of textbooks, which I then submit an alternate media request form online, on the college website. Then from then, basically, I don’t know if there’s any more material. I don’t know if there’s online material. I probably should have more contact with the instructor to find out if there is

\textsuperscript{26}Microsoft introduces Ribbon since the release of Office products in 2007. Many toolbars and menus in common applications such as Word, Excel, Outlook, and PowerPoint have been reorganized and combined into Ribbon. Website: https://support.office.com/en-us/article/Use-the-Ribbon-instead-of-toolbars-and-menus-d946b26e-0c8c-402d-a0f7-c6efa296b527
anything else that needs to be converted, but I didn’t think about that until right now.

Another point that I have, where my notes that I take, my recorded notes that I take of lectures, I have to go home and transcribe. That’s extremely time consuming, because that’s basically listening to another four-hour lecture and taking my own notes, because I’m not skilled to where I can multitask and constructively listen to the lecture and get anything from it, and type my notes at the same time.

**Interaction with Faculty Members**

It is my best guess and understanding that the teachers are not very familiar with working with students that have visual impairments. Sometimes I receive the feedback and comments on assignments from the instructors in written format and it is not accessible to me. Typically, the instructor kind of forgets until they’re handing out the reading materials in class, and then they tell me, “Oh, e-mail me.” or “I will e-mail you that as soon as I get a minute when I get home … and my office hours are …” That creates a delay in it for me. I will take a printed copy of my own, just in case I need to provide that to the DSS, or if I need to scan it myself to read it quickly. I like to play on the safe side with that.

One of my instructors seemed to be extremely busy, and she had several TAs. She usually more often than not, had her TAs deal with students, unless she had a few minutes after class and it was a quick question she could answer. As far as with me, she was attentive when it was necessary and important, such as submitting exams to the DSS or getting me something she did have available. Otherwise, if it was a class question she had the TAs answer it for me.

In my other class, one time I have problem submitting my assignment to Moodle using Internet Explorer. First, I was kind of distraught. I didn’t know what to do; I needed to submit my assignment. I’m not familiar with Firefox. I actually had to go and download it after doing
my own kind of investigation. I immediately emailed my instructor and let her know what was going on. She let me know that I was free to email it to her if that’s what I needed to do to submit my assignment. I had actually worked on my assignment early, so I was ahead of the deadline. I let her know well in advance. Once I figured that out, I let her know that I was able to submit my assignment to Moodle. It ended up working out but it just was a challenge to get there.

I haven’t used Moodle much at the time but everything was very nicely organized, easy to find. I was able to use my headings to navigate weekly assignments. My instructor was very helpful at providing accessible documents for me to personally be able to retrieve. For example, she made available the same assignments or articles in HTML format and PDF, and in Word document. She was very helpful with making sure that the assignments and articles were available to me. We were able to view other student’s assignments, and we also had to comment on those. That wasn’t an issue. Like I said, she provided very detailed instructions on how to complete the assignment and the directions were easy to follow. That’s why I started using Firefox. Now every time I get on the university’s website or Moodle, I always use Firefox. It works very well now.

**Navigating Online Learning Environments**

Internet Explorer is definitely my favorite. I feel like it’s the most accessible. Not all sites are accessible with Internet Explorer, though. Firefox is a close second, but like I said, it bounces me around the screen. The edit fields are a little tricky, as well. It starts reading me some confusing mumbo-jumbo. That’s where that gets confusing. Otherwise, it works pretty well. Chrome I’m not too experienced with. I’ve tried it a couple times. I believe I didn’t stick with it because it wasn’t very favorable. Firefox is the close second. However I don’t remember what it was exactly that shined me away from it. I would say, yeah, definitely Internet Explorer is my
favorite web browser and first choice to use. Firefox is my second because although it seems to have a few kinks that still need to be worked out, I have found that it seems to work well with everything Internet Explorer doesn’t...

Given the directions to get to the website, being able to navigate was not very user friendly. I believe the headings were kind of all over the place. They weren’t organized well, meaning that if I were looking for a particular week’s assignment, it would skip weeks and the headings were kind of random on the page. They didn’t appear to be in any particular order. That made it difficult for navigation. Another thing I like to use if I’m familiar with the page, I’ll use my links list, and I’ll find my assignments that way. The links list, those don’t always work as well either when I pull up the links list. I don’t remember in any particular situation, but I do remember that sometimes the links in the link list don’t even open. I would have to go down and actually find the link a couple of times to get it to open.

When I’m looking to read a certain set of information and skip the rest, it is tedious to have to go line through line and find what I’m looking for. Then if I happen to, for instance, I think it’s Firefox that jumps my cursor around on me sometimes, so I lose my place and I have to go back and find it. It’s difficult not having a labeled heading so that I can just go to where I need and find what I need more quickly and efficiently. It’s better than Chrome, definitely. I feel like if I had to say anything about Google Chrome, it’s not very accessible. Of course, I haven’t used it in a while because it wasn’t.

On Moodle I didn’t have too much trouble. Obviously at first I wasn’t too familiar with the system. I come from using Blackboard at community college. They’re similar in a lot of ways, but they’re also very different. Blackboard first, I was able to navigate with my preferred Internet browser, of Internet Explorer. Moodle I noticed is not very compatible with Internet
Explorer. It’s a little bit challenging to me just because of the difficulties I have with Firefox. I think all things always have room for improvement, but I think just because I was so familiar with Blackboard, it came pretty natural to me. Once I figured out its navigation. I think it was more straightforward. Moodle is straightforward too, once I understood and learned its system. It wasn’t difficult for me to figure out how to navigate. Typically I have my Internet settings set up to where immediately when I get on a page it pops me into the edit bar. It will put me in the Search bar or the Login field. If not, it puts me at the top of the page, and I’m able to navigate downward. When I’m visiting a site for the first time, I typically just down arrow to read all through to see what options I have to explore the page first. When I become more familiar, then I start navigating by headings. I believe that was one thing Moodle was very well setup to where I could navigate through headings, and get to where I needed to go, with simple keystrokes.

Both Internet Explorer and Firefox will let me explore the page with headings, but Firefox is compatible with Moodle, where Internet Explorer is not very compatible. The incompatibilities I’m talking about is where Internet Explorer will block out buttons on Moodle from me, ultimately not allowing me to click on the button whereas, Firefox won’t. Firefox will allow me to actually click on those buttons. I experienced this mainly in the fall semester of two thousand and fourteen, when my instructor required us to use Moodle for assignments. There were, I’m not sure what to call them, I guess they were blog assignments, where I had to go in and type my assignment directly on to the text field. When I was using Internet Explorer, it would not allow me to submit my assignment because it would hide the button from me. When I was using Firefox, it allowed me to submit my assignment.

Graphics and images get in the way. They’re tricky. Sometimes they make links or buttons that say “graphic” as well, so that’s a little difficult to differentiate whether a graphic is
only a graphic or a graphic link or graphic button. Let’s see, what else? When dealing with the formatting of the webpages, I use my shortcut key for headings to jump to different headings a lot. It’s difficult when a site doesn’t have a proper system or labels. It’s nearly impossible to find things.

**Accessing Online Course Materials**

I’m still trying to figure out PDF formatting and forms. The reason I mention those is because a lot of them are online now. I’ve discovered that. I think the main issue with that is finding the right format and the right PDF reader to accommodate my needs. That’s definitely one of the things that I run into. I’ve had a couple teachers, I let them know that I need an electronic text format of something, and they’ll run over to the scanner and scan it really quick and email it to me. Then when I go home or when I finally get around to checking it, it’s just a picture. It still is no good for me. That’s one of the most difficult barriers I’ve experienced, I’ve encountered so far. Image-based PDF files won’t work with my JAWS screen reader. It puts me a little behind. If I have the time, which I don’t always, but if I do have the time and if it’s a weekend or something, and the alternate media department is not able to provide that for me, basically on the drop of the dime, I will print out that document and try to scan it myself with my open book program ... Yeah, and I will use my own OCR, my OpenBook or my Eye-Pal SOLO and read that out myself. Like I said, it’s mostly accurate, but all it takes is a couple of words to get messed up to make it not legible or understandable.

A couple of my teachers, and this is one of the main issues I ran into last semester, two of my classes, my teachers had their own websites where they would post articles and assignments and handouts. They were mostly PDF forms. The links, I was able to get into them and find them okay. Once I would open the link, it was a PDF form that was not accessible to me. Also, there
were ... Oh, what are they called? PowerPoint slides. I’m not sure how my instructor did that, but somehow he took the PowerPoint and put it into, I don’t even remember the format. I don’t think it was a PDF. Typically, I’m able to open PowerPoints and get the text off them. I think it’s called the outline format. With his particular website and his formatting, which as I said, I don’t recall what format it was, but it would not let me open it... Once I’d open the document, I’d just get stuck there with nothing. Pretty much the whole base of that class was those kind of assignments that were not accessible to me. I had to go through the Alternate Media department to supply me with all of those handouts and readings, assignments, and PowerPoint slides, so that I could study, and take exams off of, and have the forms for class each week. That was definitely a challenge.

Final Thoughts

In my experience taking the hybrid courses here at the university, first, I didn’t know they had online components. Second, there was no other option. They were classes that I wanted to take, so that was the only given opportunity I had to take them, so I was stuck with it.

I think online learning environments were built for the typically sighted user. However, I think that it’s been made aware of, and I think it’s a work in progress. I’ve noticed so many things are becoming more accessible now that awareness has been raised. However, like I said, there’s always room for improvement. There is still a lot that needs to be fixed and worked, but I’m able to manage and get by. I think that’s really important, and I appreciate that. Technology is moving. Online learning contents are not equally accessible to everyone. Unfortunately I don’t like that I have to say that, but eventually yes, teachers once we create that awareness for them, they’re really good about helping to make everything equally accessible. My education is extremely important to me, and I don’t like having to sit out or miss out on something just
because it’s not accessible to me. I want to know. I want to learn just as much as everyone else is learning. I personally appreciate the opportunity to have all these materials.

It’s basically one of those things where I have to accept my limitations as well. For example, in my cognitive psychology class, we had one class completely dedicated to experiencing different learning abilities, different motor skills. There were instances where a lot of it was tactile, but there was also a lot of visual aspects, where somebody had to read something and we had to memorize it. That was fine on the part where somebody read something to me, and I got to memorize and read back. However, that person kind of missed out being my partner because I wasn’t able to provide the visual aspect of the experience. We played charades and ... my teacher actually came and picked a card for me, whispered in my ear what to act out so the other person could guess it. It worked out in that aspect, if someone else is able to help out it works. In the visual aspects of classes, I’m not able to participate because the instructor’s busy teaching the class. There’s not always a TA that can come in and sit with me. Other students, the teachers want them to participate, so I’m expected to sit out. Typically, in those kind of situations, a teacher will explain to me after class or before class, or even on a break, what’s going on. It’s not the best experience to have to just sit out because of my limitations.

The only thing I would like to see changed is to I guess... inform the instructor and raise awareness of my needs a little bit better. The Alternate Media Center and the DSS center have done an amazing job. Unfortunately, the instructors are just not experienced. It would be nice if they had a little more common knowledge on how to work with me. An example is last semester in the spring, one of my instructors was the DSS communicated with her and let her know. She was still having a hard time kind of figuring out what I needed. Finally, by the end of the semester after having the actual experience of working with me, and getting the hang of things,
she was on top of it. Initially she didn’t have experience, or she just kind of didn’t know what to do in order to help me and make sure I was prepared for her class. It would be nice if the instructors maybe had a little bit more of a heads up, so that they knew what to expect. They could better help me succeed in that class.

Ryan’s Story

Ryan was the last participant I interviewed for this project. The 24-year-old is now in his senior year and majoring in Business with a concentration in Finance. Ryan is highly motivated, resourceful, and skilled in working with speech recognition applications to manage not only common personal computer environments but also business-oriented software applications. His next plan is to continue on to pursue his Master’s degree in Finance.

I have appointments with Ryan regularly throughout the semester to provide alternate media services such as textbooks, course readers, and other classroom materials as well as assistive technology services such as use of voice recognition applications for accommodated exams appointments. I often have discussions with Ryan on recent updates and upcoming trends in assistive technologies. Similarly, Ryan would share with me his valuable insights derived from personal experiences as assistive technology power users. My interview sessions with Ryan are an extension of our ongoing conversations.

Disability

Back in 2009, I have broken my C4 and C5 vertebrae so I’m a quadriplegic. I have a very hard time using any type of real tangible textbooks. All my books therefore have to be put on either online as in going through companies like Chegg27 or as digital formats like PDF so I can zoom in and out add notes and things like that.

27 Chegg is a popular company based in Northern California that offers online textbooks and eTextbooks rental services mainly to college students. Website: http://www.chegg.com
Alternate Media

I usually request a PDF format for my reading materials. I mean I have no problem reading myself but I’m a slower reader. But I definitely like to read it instead of having someone else read it to me. Especially the robotic type voices that the text-to-speech applications use, I don’t do too much of that, just every now and then. I definitely prefer the publisher’s text-based PDFs than scanned image-based PDFs because I cannot just select the words and then copy them in the image-based PDFs. Also if the PDF is text-based, I can use the “Search” feature. Oh, my gosh! That makes it so much easier. That is good for me just being able to search inside the PDF using keywords or phrases would just help save so much time of studying and researching to maybe make some type of study guide or writing papers. If you know part of the quote, you can just search for it without having to read an entire chapter or something. Yeah, that’s huge.

Usually the process takes about a week or two from purchase to delivery in my Dropbox. If the Alternate Media office has it on file, then it’s almost instantaneous. For me, I have trouble handling any physical information and then having it in front of me. When handouts are put online, if handouts or the syllabus, the more information that’s put onto the computer screen and on the class website, that’s definitely makes it easier for learning and operating.

The eTextbooks that I get directly from the places like Chegg often requires the use of their own platform to access online using a Web browser. I had more trouble using speech recognition to interact with these books. Like if you want to trim the page you always have to click or…instead of just keep scrolling down. So I only would of used the Microsoft version and it works with it but I would have to use the MouseGrid a lot and it’s nice that sometimes they do save you spot where you left off … your chapter or what not but if you want to have to try to select different chapters if the professor skips around and things like that it’s a lot harder to work
with. Because I rent these eTextbooks, they are only available for limited amount of time which
is sometimes unfortunate if you want to go back if you need to of if I’ve had classes that use the
same textbooks that would have sucked. But it’s also maybe if I want to look back and I
remember we used some particular strategy in my other basic Finance class and then I want to
use it and let’s say insurance then if the textbook expired then it’s hard to go back and refresh the
memory or get the ideas back. I’ve only used Chegg for a couple semesters and I prefer PDF. It’s
just a lot easier because I can have it permanently on my Desktop and it works well with
Microsoft’s Speech Recognition.

There has been one hybrid class where I think all the material the instructor provided
online so that nobody had to buy anything; just I could get all the printouts, all the PDFs were
stored online, archived. It was a lot easier. Everybody can access them; nothing needs to be
handed out in class.

Assistive Technology

The main technologies would be the Dragon speech recognition over here and then I use
the Microsoft one at home but that one’s got a really terrible dictation. So if I want to write an
essay or anything it’s really bad at translating and transcribing it. The Dragon is 100 times better.
But if it’s just for MouseGrid and small things like that, it doesn’t really crash on me as Dragon
can do and it’s a bit faster at that. There have been a couple occurrences where the Microsoft
Speech Recognition at least, I know the Microsoft didn’t really work with the text field. The only
time it would work if I’d say: “Press A, Press N, press D.” to spell out the word “and” instead of
couldn’t just dictate normally by saying the word “and.”

28 When Ryan uses Dragon NaturallySpeaking to dictate and format his documents to ensure accuracy while taking
his exams at the Disability Services for Students’ testing accommodation facilities. He prefers the built-in Microsoft
Speech Recognition feature to perform tasks within other Microsoft’s products and environments.
Luckily, as a Business major I don’t have to do too much of this writing stuff. But if I did, I would probably come on campus then to the Writing Center and use the Dragon because I can access my roaming voice profile anywhere on campus using the university’s computers.²⁹

Yeah, it’s less time actual reading and more time to scan to understand how it’s done, the process. From that standpoint, then, in a way, it gets more challenging and time consuming especially if I want to practice the problems, then I’ll open up Excel and then that will take a lot longer than if I have to try and use a calculator. In Excel, there are a lot of built-in formulas, which can be nice especially with some holding a lot of numbers. Sometimes, I will have to write my own formulas and input the numbers. If it’s basic stuff, just calculation, stuff like that, then it’s fairly easy.

If it has to do more complicating for my Finance classes whereas you want to take the timed value of money and things like that, then having to go in and use some of the built in functions, it takes definitely a lot more time than most students who have a calculator and can press couple buttons and get it within 20 seconds. For me, it will take two to three minutes.

**Additional Academic Accommodations**

I definitely use extra time when I take the exams. I may use additional 50% or 100% time depending on what the test involves. Some professors have been pretty helpful with it. So if they know I need extra time and the test is an online type thing they’ll open up the test a little early or keep it open a little later. When calculator is allowed during exam and if it’s basic calculations, luckily, I do have some movement in my right hand and the fingers. I’ll just open up the calculator on my phone and then do the calculations that way.

²⁹ Mouse grid is a hand-free mouse control feature using voice commands to direct movements, adjust position, and perform clicking functions of the computer’s mouse pointer available on both Dragon NaturallySpeaking and Microsoft’s Windows Speech Recognition applications.
When I was at the junior college, they would always hire a scribe and they would fill in the Scantrons. But I feel like that was a real big waste because the person, the helper, test taker, is just sitting there and all they have to do is bubble in an answers, if they did use the Dragon like I use here and just the teacher corrects the one extra exam, I think that would have been so much easier, not only on them but save them probably a good amount of money.

When it comes to exams, if I take it on campus and at the DSS office. For most exams, the teacher will provide a Microsoft Word format. I’ll highlight the correct … if it’s a multiple-choice exam, I’ll highlight the correct answer and then bold it. This is all using Dragon. Then, if it’s few response essay type thing, since Dragon is pretty damn good at it, that’s no problem writing it out. If it’s an exam that’s online only, I usually take it home. A lot of those require clicking the correct answer. That takes the longest MouseGrid command to narrow it down to the tiny little circle. It’s not only one click. A lot of times it’s click on the circle, and then click either next question, or if it’s just scrolling down a page, it’s not that bad, but if it’s click and then next question then that’s a lot. For those, if those circles were bigger, it would definitely help. A regular student just raise a question and then goes tic, tic. For me, I’ll have to go MouseGrid: “Five, One, One, Two, Three, Click.” and then if I change answer then I’ll go again.

**Interaction with Faculty Members**

When I need to communicate with the instructors, email is usually just fine, some instructors are terrible with email though, they say, “Oh, go and leave me a voice mail.” They prefer voicemail rather than email because I guess they’re just too old to learn how to type properly. When there’s something wrong with the online course like for some reason these files are not working for me, the teachers would try to fix it right away, they would see first if it was just my problem on my end or if other students were having the same issues and if it was just
something for me they would either through just email try to resend it or re-upload it and see if
that would help and work then.

I’d like to have the required information, things … reading materials so that I could
request alternate media services in advance because it takes a long time for the files to be
converted or to get them from the publishers. I’m sure the school is already been on this but
some professors don’t put up the information ever. On our first day, they’ll just have in on their
syllabus. Even if you email them, since they don’t do email, they’ll never get it so just maybe
being one of the requirements. Have it for your next semester. I’m sure you’ll be using the same
textbook or if you know you’re going to be changing it, just switch it up.

I have taken courses where it’s just straight up online courses, and there a lot of them
have the discussion boards and those can be helpful, those can be pretty annoying especially if
you have requirements where you at least once or twice a week you have to get on and access it.
If you have to reply then there’s a lot the MouseGrid type thing and that can be pretty annoying,
tedious. If it’s going to be a lot of typing then I’ll try to use the Dragon. If it just a couple
sentences then I’ll stick with the Microsoft.

It's nice for the grading that they don’t just have the number or the percent that you get
but there's also an input. They could say, “Okay, maybe improve this a little bit.” or “Well done
on this section. That's good.” Last semester, my Insurance/Risk Management was a hybrid class
where we had class twice a week and all the other information was online. First, my professor
would post job openings, which was nice, which was part of, I guess group’s project. Everything
he received whether it's from his past students or current students, he would put up online so
students could have access to either job openings or his PowerPoints almost weekly. He called it
quizzes but it was just practice problem. They didn’t count towards your grade. You could redo it
and redo it just so you'll learn the information of continuous repetition of going over it. That's been the only class that has been like that for me. I know it's definitely helped a lot even though it was stupid having to narrow down the MouseGrid. Even it was that, it just helped the learning.

**Navigating Online Learning Environments**

The main one I’ve had to use for school-based was Moodle and that’s been pretty good. I know the site has changed at least twice I think now since I’ve been in school so they keep updating it and changing the format of it a little bit. Every semester, the classes updated on there so that’s nice instead of me having to go and update it, search for the course. Although there’s a lot of mouse clicking I have to deal with. First, I want to get on to my Moodle, then select which course, then select which chapter or what section of the course. Once I’m actually in the course, it’s really nice because for most classes, all the information is right there whether it’s hand-outs that we’re given in class, everything from syllabus to chapters, PowerPoints that teachers put on. If you miss a class, everything is on there.

I use Google Chrome and navigate using MouseGrid from Microsoft Speech Recognition. Yes, we go mouse grid. I have the university’s website bookmarked on Chrome web browser. That way I don’t have to go into the tool or the search bar. Just a quick one click and then from there, just sign on. It’s nice …that you can choose Moodle or e-mail, etc. That’s nice but then you have to go and select which course. It’s a lot mouse clicks. It adds up especially when you want to switch from course to course. When I have to type into the text field on Moodle, I don’t know if it was just the browser but, yeah, that would have been in Chrome. All in all, it’s not too bad because I could just type it out in Microsoft Word and then say: “Select All,” “Cut,” and then switch back to the browser and “Paste,” “Submit.” It wasn’t terrible but it’s just a little extra.
When I work on group assignments, we use Google Docs and Google Slides so everyone could participate at the same time… asking question, leave notes, stuff like that in real-time. The school uses the Gmail for its e-mail so getting into Google Docs and Google Slides is really easy. It’s not very challenging but it can be time consuming. Again, with mouse grids, if you want to put image on or type in Google Docs using Microsoft Speech Recognition, it doesn’t work. So I’ll have to put it into either WordPad or Microsoft Word and then so like copy, cut, switch to Chrome, paste. I know Microsoft probably built theirs strictly for Internet Explorer, which is their web browser.

In dealing with Discussion Forum in Moodle, if the teachers require a lot of it, it’s a pain in the ass. Yeah. Once in Moodle, you would have numerous threads. Then you have to go from one to another. Then if the teacher requires you to pick one or two and then reply to that, having to go from one person and it’s a bunch of crap that you don’t want to reply to, then you have to go back out of it and then try to read someone else’s. That’s definitely a lot of mouse clicking. Try to eliminate a lot of that would be nice. It would be nice if there were just one button where they could click to contact the professor instead of having to know their e-mail and then switch to the email to contact them. Just one button, you click it and then you type in your question, whether it’s a chat type of thing.

Accessing Online Course Materials

Commons files formats are PowerPoints, Microsoft Word, PDFs… sometimes they’ll put up scanned pages from other textbooks, newspapers or some type of outside source. Some of my online courses have videos of the instructor’s own lectures. Also, they have done outside things like YouTube where they found outside sources that relate to the topics. They don’t really work very well with Dragon or Speech Recognition… if I want to, say, Pause/Play so I would have to
use the MouseGrid… MouseGrid everything. I think the Microsoft Speech Recognition only really works pretty well with the Internet Explorer but it also glitches out on it a bit. It’s just a terrible interface so I don’t use it.

In other cases, I’ll just go onto the Moodle page and then go and click onto the direct link and that will open up the video. It’s pretty easy, just say “Press Space Bar” or “Press Enter” and then it’ll pause it for you. The only thing, especially with watching videos, is that the sound of it can interfere with the microphone. Even if it’s just inside the headset, not coming from the computer’s speakers, it still, for some reason, interferes. In that instance, I’ll just tell the programs to “Stop Listening.” The only problem sometimes that can occur is once the video is over or you want to start listening, it can take a while, if ever, to turn it back on. Sometimes, the challenge is it turns itself off. It’s like, “Oh I’m hearing too many things I’ll just turn off.” Then I need someone’s assistance to come and turn it back on.

**Final Thoughts**

Sometimes online course is the only thing that they offer. Sometimes it would just fit within the time schedule a lot better so I could do it on my own time and just do it basically whenever it suits me. Some have been recommended to do online instead of go in and waste the time in class. For the most part, I’ve had good experience with it. It’s just more time consuming than going to a class. I feel like, comparing to other students in my classes, I share about 90% of the same online learning experience and the level of access to online classroom materials. I just have to put in a lot more effort and time to access the contents and to achieve the same tasks.

When you and I talked about the test taking, having an easier way to answer the question in a multiple choice type exam would be probably the biggest thing from time standpoint. Having maybe more documents scanned and put online that sometimes professors will hand out, that
would be probably the second biggest thing. I know a lot of other students have asked for it for just to be put up. People miss class for whatever reasons, sometimes medical. It’s just nice to have as much information online. Then as long as it’s also laid out in a good thing, not just all right, have it all this information just one tiny spot where there’s a lot of clicking to get to it. Taking online exams and quizzes is probably the most challenging task because I have to use so much MouseGrids and having to narrow down to the tiny little box. The one thing that’s also bothered me during some tests is every student that’s in class taking the exam, if they have a question, they can go ask the instructor. For me, if I have a question I have to try to use deductive reasoning of what’s the most possible thing that the instructor is asking.

When I need to ask questions, if the instructor uses their email then it’s not bad because they’re pretty good at getting back. Those that don’t, it’s very challenging. Unless you know someone in class and you get in touch with them, it can be very difficult. In the past, I have left side notes or just written after the question, my question, but I have no idea if the instructors ever see that or consider it and the question, so something like if the question asks something, I’ll say, “Well, from what I think you’re asking, this is my answer, but if you’re asking this then the answer should be C.” Yes, something different but whether the instructor ever sees it, I don’t know.

In the Discussion Forum, maybe there should be a preview of the posts, let’s say three line example of what the person was saying so then you don’t have to go, “Nope, sorry. No.” Go back, go back, go back. You could at least take a quick sample of what they’re talking about. Yeah, just like when you’re searching for websites on Google, it’ll give you a quick snapshot of what the website is about. I’d like to know the same thing about what this topic is about.
For maybe a spring semester where in a winter when we have about a month off but the teachers aren't going to post their information, having to get the book almost the same day as the first class and then having to get it formatted, it can be very annoying. Getting textbooks and reading materials in alternate formats takes a very long time. Yes, I can attend class. I can learn everything that's there but I cannot do the weekly reading. Then a month into school… Alright now… on our first exam … Hey, my textbook got here. That is definitely something that could be improved upon. I took a summer class last summer. That class is only three weeks, an entire semester’s worth. It was nice for me to get the textbook early because I knew I was going to have plans in the middle of that three-week thing so I could read up ahead of time to where I'm not going to be scrambling.

**Summary**

This chapter presented the narratives of five selected participants introduced under the pseudonyms: Mario, Hannah, Ella, Sophie, and Ryan. This study utilizes Polkinghorne’s (1995) analysis of narrative method to “locate conceptual manifestations among the stories collected” in effort to demonstrate the “relational significance” among the lived experiences of five students with disabilities who overcome the challenges as the results of inaccessible WBLC while taking online and hybrid courses. Using the data gathered through open-ended interview sessions, artifacts, and additional descriptions, each participant’s narrative is organized into eight topics: 1) disability; 2) alternate media; 3) assistive technologies; 4) additional academic accommodations; 5) interaction with faculty members; 6) navigating online learning environments; 7) accessing online course materials; and 8) final thoughts.

Findings indicate some level of awareness among content creators and online course facilitators in the areas of accessibility within online learning environments. However, based on
participant’s experiences as learners who rely on assistive technologies while taking online and hybrid courses, the issues pertaining to inaccessible Web-based learning contents remain problematic. Chapter 5 of this study focuses on exhibiting detailed analysis of the research findings. As an active practitioner in the field of accessibility, the researcher seeks to highlight the issues pertaining to inaccessible WBLC in higher education online learning environments. Ultimately, this study supports the ongoing effort to improve current practice and future research toward a more accessible and inclusive learning experience for all learners.
CHAPTER V: DISCUSSION AND CONCLUSION

As Polkinghorne (1995) describes, findings in an analysis of narrative qualitative study “are derived from previous theory or logical possibilities and are applied to the data to determine whether instances of these concepts are to be found” (pp. 7—13). Appropriately, a review of literature in Chapter 2 of this study suggests accessibility of the online learning environments within higher education remain an afterthought during the process of planning, designing, and deployment of online courses. The researcher utilizes a selection of the accessibility industry-standard tenets as outlined in Universal Design for Learning principles and Web Content Accessibility Guidelines (WCAG 2.0) to examine issues pertaining to inaccessible online learning contents and the online course management system. Table 10 highlights the set of UDL principles for curriculum planning and development processes to ensure all individual learners have equal access to learning contents and classroom activities. CAST (2011) describes UDL as “blueprint” for content creators and designers to create accessible instructional materials and learning environments, “not a single, one-size-fits-all solution but rather flexible approaches.”

Table 10
Overview of Universal Design for Learning Guidelines

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Engagement</strong></td>
<td><strong>Representation</strong></td>
<td><strong>Action &amp; Expression</strong></td>
</tr>
<tr>
<td>For purposeful, motivated learners, stimulate interest and motivation for learning.</td>
<td>For resourceful, knowledgeable learners, present information and content in different ways.</td>
<td>For strategic, goal-directed learners, differentiate the ways that students can express what they know.</td>
</tr>
</tbody>
</table>

In addition, based on the participant’s responses, a number of applicable tenets are selected from guidelines pertaining to the process of developing accessible learning objects according to the WCAG 2.0 described earlier in Table 7 and Table 8 of Chapter 2. Evidently, while navigating and accessing their online and hybrid courses, the participants reportedly find themselves repeatedly having to face accessibility issues such as illegible font sizes, inaccessible image-based PDF documents, and improperly constructed navigation, to name a few. In the subsequent sections, detailed analyses on how a number of elements within the online learning environments influence the level of accessibility will be discussed.

Discussion

The following research questions help guide the direction of this study:

*What are the difficulties that college students with disabilities have experienced when they navigate and access online instructional materials?*

Indeed, this study seeks to understand the issues pertaining to inaccessible WBLC and the online learning environments in higher education based on the insights from participant’s lived experiences. Table 11 summarizes important characteristics of each participant including demographical information, documented disabilities, the selections of alternate media (AM) and assistive technologies (AT), current status and future academic goals. Evidently, all participants are highly motivated and have successfully achieved major milestones during their educational careers to this point. The participants are knowledgeable in terms of utilizing assistive technologies for academic purposes and environment as well as resourceful in resolving access-related issues.

However, there continue to be barriers which the students find impossible to overcome without additional support in order to fully participate in classroom activities and to access
WBLC in timely manner. The following sections respond to the overarching research question in which it examines the difficulties that students with disabilities experienced while taking online and hybrid courses.

Table 11
*Summary of Participant’s Demographical Information*

<table>
<thead>
<tr>
<th></th>
<th>Mario</th>
<th>Hannah</th>
<th>Ella</th>
<th>Sophie</th>
<th>Ryan</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>29</td>
<td>38</td>
<td>49</td>
<td>30</td>
<td>24</td>
</tr>
<tr>
<td>Gender</td>
<td>Male</td>
<td>Female</td>
<td>Female</td>
<td>Female</td>
<td>Male</td>
</tr>
<tr>
<td>Disability</td>
<td>Visual Impairment/Blind</td>
<td>Cognitive/Learning</td>
<td>Cognitive/Learning</td>
<td>Visual Impairment/Blind</td>
<td>Mobility</td>
</tr>
<tr>
<td>AM</td>
<td>PDF, KES, DOCX, DAISY</td>
<td>PDF, KES, DAISY</td>
<td>PDF, KES, DAISY</td>
<td>DOCX, DAISY</td>
<td>PDF, HTML</td>
</tr>
<tr>
<td>AT</td>
<td>ZoomText, Windows Magnifier</td>
<td>Kurzweil, R&amp;W</td>
<td>Kurzweil, R&amp;W, Read2Go</td>
<td>JAWS, Victor Reader, OpenBook, Eye-Pal SOLO</td>
<td>Dragon NS, Windows Speech Recognition</td>
</tr>
<tr>
<td>Degree</td>
<td>Electrical Engineer (B.S.)</td>
<td>Psychology (major); American Multicultural Studies (minor) (B.A.)</td>
<td>History (B.A.); Single-Subject Teaching Credential (Post-baccalaureate, 2016)</td>
<td>Psychology (B.A.); Vocational Rehabilitation Counseling (M.S., 2016)</td>
<td>Business Administration (B.S.); Finance (M.B.A. or M.S., 2016)</td>
</tr>
<tr>
<td>Year/Status</td>
<td>Senior/Full-Time</td>
<td>Senior/Full-Time</td>
<td>Senior/Full-Time</td>
<td>Junior to Senior/Full-Time</td>
<td>Junior to Senior/Full-Time</td>
</tr>
<tr>
<td>GPA</td>
<td>3.6</td>
<td>3.3</td>
<td>3.62</td>
<td>3.95</td>
<td>3.3</td>
</tr>
</tbody>
</table>

**Online Learning Environments**

All five participants reportedly experience difficulties while navigating online learning environments. The most common issues involve the placement and format of online course’s menu. Locations of the course’s menu are not consistent when students switch from one online course to another. This issue emerges due to the fact that individual instructor chooses to
customize the structural elements of their online courses differently. In one class, students may find a list of links to their weekly reading assignments placed in the middle of the page while they could be nested under a tab in the lower right corner in another class. In addition, in some instances of hybrid courses, instructors may choose to post the list of assignments and due dates online and update the information throughout the semester that are differed from what presented in the printed version of their course’s syllabi.

The format of online course’s navigations is problematic. The use of small font sizes is challenging to students who possess limitations in visual, cognitive, and mobility. Small font in a nested menu makes each link difficult to find whether a student is sighted or using assistive technologies such as digital magnifier or voice recognition to direct computer mouse pointer to locate and select. In addition, organizational methods of online files and web links often severely lack intuitiveness. For instance, students are confused while accessing a list of items with heavily abbreviated names, broken links, and missing descriptions or instructions on how to access.

In addition, participants also find that common elements of webpages such as headings, text fields, and buttons are poorly designed. For instance, when Sophie uses her screen reader to navigate a webpage in her online learning environment, she uses keyboard shortcut to bring up a list of all headings available on that page. When the contents are not properly formatted using hierarchy structure to mark title, heading 1, 2, 3, etc. as well as numbered list using standard conventions such as I…II…III or multilevel list such as 1…1.1…1.1.1, Sophie is required to navigate the entire page one line at a time using her keyboard or wait for her screen reader software to read from the beginning of the page to the end in order to access information. This presents a tremendous challenge to screen reader users like Sophie when they process large amount of information while performing usual tasks such as reading and researching.
In other cases in which buttons and text fields are not properly designed and labeled prevent participants from finding the option to simply type or insert their responses to a forum thread. In other cases, the participants are not able to upload or to submit their due assignments because their assistive technologies cannot operate within the online course settings. Also, the use of graphical elements in place of text without alternative text-based label found in webpage’s buttons or links would ultimately render the elements impossible to access using screen reader.

**Web-Based Learning Contents (WBLC)**

The participants find it burdensome to locate and access classroom materials in their online learning environments. For instance, some files will open in their web browsers; some will be downloaded to their computer’s hard drive while others will direct them to external sources such as the university’s library pages where eBooks are hosted or third party websites that are located outside of the current online course environment.

Particularly, while eBooks are convenient for hosting and distributing learning contents, they are challenging for a number of learners with disabilities who rely on assistive technologies to navigate and access the information. When being redirected from their current online course to a different environment, students such as Mario, Sophie, or Ryan are required to relearn the to navigate all the structural elements including menu, button, scrollbar, labels as well as functionality and behavior of such environments. Finding and accessing reading assignments using such process is not a small task to achieve especially in cases of students such as the five participants who already spend on average three to four more times the amount of hours per week to manage learning tasks comparing to other students in the same class.

All participants, regardless of disabilities or preferences of assistive technologies find it difficult or impossible to access image-based PDF files. Essentially, an image-based PDF file is a
digital version of its physical printed copy. This type of PDF files consists of pictures of contents such as texts, tables, and charts. Image-based PDF files are not accessible to text-to-speech and screen reader applications without the involvement of specialized software to perform optical character recognition (OCR) and a considerable amount of editing and reformatting processes conducted by trained professionals subsequently.

Evidently, an image-based PDF document is not searchable using speech-recognition tools or keyboard shortcut and thus it is impossible to perform search function using keyword terms or phrases. That is to say, for student like Ryan to look up a function under the section on *Equilibrium Conditions* in his textbook, he would have to use voice command to direct MouseGrid feature, select the scroll bar to turn pages or repeat the command “Page Up” or “Page Down” countless number of times while visually identify the key terms and functions.

**Limitations**

There are several areas of limitation in this study I would like to address. First, while it is possible to present fruitful insights based on the experiences of the five participants, the data sample does not include experiences of students with disabilities who are newly admitted and taking online or hybrid courses for the first time. Second, because none of the students who possess deaf/hard-of-hearing conditions participated in the study, their unique insights and recommendations are absent in this data. Third, the study takes place at one public university campus in Northern California and therefore the selected participants and findings pertaining to accessibility of the online learning environments are unique.

Finally, while considered by most as reasonable aspects of a qualitative narrative inquiry, it is important to recognize that the researcher’s perspective on problem of practice, positionality, and biases are evident during the course of conducting research, analyzing and interpreting data.
Conclusion and Recommendations

The overarching goal of this study is to accentuate the issue in which accessibility of online learning environments and web-based learning contents within higher education campuses remain habitually an afterthought. At the same time, the effort to create and provide an inclusive learning environment to learners with disabilities is often misinterpreted merely as the utilizations of campuses’ disability services and accommodations.

Evidently, existing literature indicates students with disabilities increasingly enroll in online courses. Yet, the common practice at many postsecondary institutions to accommodate this group of students such as retrofitting inaccessible WBLC continues to presents negative effects on their learning experience. For instance, the process to create and provide alternate media such as Braille, accessible electronic text, and auditory learning materials is complicated, lengthy and costly. More importantly, providing reasonable accommodations should not be considered as the only option for student with disabilities since this practice deliberately places a group of students outside of an inclusive learning environment.

While evidence of progress has been visible, students with disabilities still find it difficult and, in many cases, impossible to navigate and access online learning contents. Studies indicated a number of factors that contributed toward the issues of inaccessible WBLCs ranging from the lack of support, training, and funding for faculty to the inadequate establishment and reinforcement of accessibility policies at many campuses. In addition, colleges and universities still rely on the support of a small group of accessibility specialists to provide “after-the-fact” services and accommodations to students with disabilities who face challenges because of inaccessible WBLC (Burgstahler, Corrigan & McCarter, 2004; Hawke & Jannarone, 2002; Wall & Sarver, 2003).
Finally, in order to develop and maintain an inclusive online learning environment for all learners, it is imperative that higher education institutions address, evaluate, and resolve the issues pertaining to inaccessible WBLC. The suggested implementations based on the principles of UDL and WCAG 2.0 standards will help improve and streamline the process of planning and design online courses that are easy for all students including those with disabilities to access, participate, and learn independently (Roh, 2004; Gorski, 2009). In addition, courses designed with accessibility measures will not only meet the regulatory standards but will also be much more flexible for instructors and course authors to replicate, update, or modify in the future.
APPENDIX A

Transcriber Confidentiality Statement in a Research Study

Northeastern University, College of Professional Studies
Title: Inclusive Instructional Materials: A Narrative Study Examining the Current Web-Based Learning Contents (WBLG) and Online Learning Environments In Higher Education
By: Jack Nguyen

Transcriber Confidentiality Statement in a Research Study

Dear [Redacted]
I am asking you to take part in a research study. This research will collect data through recorded one-on-one interview sessions. Each session will be 60 to 90 minute-long and the audio files will be available in MP3 format. The use of a recording device is justified in this study because the details of thought and language used by the participants are critical to data analysis.

You are responsible to transcribe the audio files to ensure accurate reporting of the information provided. You will not discuss any item on the file with anyone other than the researcher. No one’s name will be asked or revealed during individual interviews. The audios will be stored in locked files before and after being transcribed. All files will be destroyed within 2 weeks of completing the transcriptions.

Who can I contact if I have questions or problems?

Jack Nguyen (Doctoral Candidate)
1460 Townview Ave., Santa Rosa, CA 95405
Phone: [Redacted]
Email: nguyen.jac@husky.neu.edu

Dr. Kristal Clemons (Principal Investigator)
Northeastern University College of Professional Studies
360 Huntington, 42 BV, Boston, MA 02115
Phone: [Redacted]
Email: k.clemons@neu.edu
Who can I contact about my rights as a participant?

Nan C. Regina, Director
Human Subject Research Protection
960 Renaissance Park, Northeastern University Boston, MA 02115
Phone: [obliterated]
Email: irb@neu.edu.
You may call anonymously if you wish.

Will I be paid or my participation?

Yes. An agreed rate of payment will be paid upon completion of the transcripts.

I agree to take part in this research

Signature of person agreeing to participate  Date

Printed name of person above
APPENDIX B

Call for Participants

Dear students,

My name is Jack Nguyen and I am a doctoral candidate at Northeastern University. I am looking for qualified participants to take part in my research project titled “Inclusive Instructional Material: A Narrative Study Examining the Current Web-Based Learning Contents (WBLC) and Online Learning Environments In Higher Education.” This study has been approved by Northeastern University’s Institutional Review Board for research ethics (IRB#).

The purposes of this study is to a) reveal how college students with disabilities perceive the challenges of inaccessible online contents and; b) suggest feasible strategies to improve online learning experience through addressing the issues pertaining to accessibilities based on Universal Design for Learning (UDL) principles and Web Contents Accessibility Guidelines (WCAG) 2.0.

In order to participate, you:
- are a college student with qualified print-related disability who receive alternate media and/or assistive technology services.
- are currently or have enrolled in at least one online/hybrid course.
- utilize at least one form of assistive technology such as screen reader, voice recognition, and text-to-speech applications in order to participate perform required classroom-related activities
- possess a challenging experience while navigating online learning environments or difficulties accessing learning contents.

All qualified individuals are encouraged to apply, regardless of race, ethnicity, class, religion, disability, or national origin.

The study consists of two interviews (approximately 60 to 90 minutes each), which will be conducted in person. The first interview session focuses on demographic and background information of the participants such as their disabilities, their knowledge and skills of assistive technology. The second interview session focuses on the challenges that the participants have experienced as the results of inaccessible online learning contents and online learning environments. Participants who complete both interviews will receive one $25 gift card to Amazon.com, Apple Store, or iTunes.

If you or someone you know would like to participate in this study or learn more, please email nguyen.jac@husky.neu.edu or call [redacted]. Selection for the study is not guaranteed, but will be determined during a brief 5 to 10-minute intake call. Confidentiality is our top priority. Participants’ names will never be shared with others or used in the published results.
APPENDIX C

Consent Form

Northeastern University, Department of Education
Name of Investigator(s):
Kristal Clemons, PhD (Principal Investigator)
Jack Nguyen, MFA (Doctoral Candidate)

Title of Project: Inclusive Instructional Material: A Narrative Study Examining the Current Web-Based Learning Contents (WBLC) and Online Learning Environments In Higher Education.

Request to Participate in Research
The purposes of this study is to a) reveal how college students with disabilities perceive the challenges of inaccessible online contents and; b) suggest feasible strategies to improve online learning experience through addressing the issues pertaining to accessibilities based on Universal Design for Learning (UDL) principles and Web Contents Accessibility Guidelines (WCAG) 2.0.

In order to participate, you:
- are currently or have enrolled in at least one online/hybrid course.
- utilize at least one form of assistive technology such as screen reader, voice recognition, and text-to-speech applications in order to participate perform required classroom-related activities
- possess a challenging experience while navigating online learning environments or difficulties accessing learning contents.

If you decide to take part in this study, we will ask you participate in two interview sessions. Both sessions will take place at a reserved study room at the library’s research floor on campus. Each session will take approximately 60 to 90 minutes. Both interview sessions will be conducted by Jack Nguyen about your disabilities and your experiences taking online/hybrid course(s).

While participants will disclose and describe details regarding their disabilities and the challenges they faced during the course of their educational career, the possibility of risks is minimal.

There are no direct benefits to you for participating in the study. However, your answers may help us to identify feasible strategies to improve online learning experience through addressing the issues pertaining to accessibilities.

Your part in this study will be handled in a confidential manner. Only the researchers will know that you participated in this study. Any reports or publications based on this research will
only use pseudonyms, and will not identify you or any other participant as being part of this project.

**The decision to participate in this research project is up to you.** You do not have to participate and you can refuse to answer any question. Even if you begin the study, you may withdraw at any time.

If you have any questions about this study, please feel free to contact Jack Nguyen, the person mainly responsible for the research, by phone at [redacted] or by email: nguyen.jac@husky.neu.edu. You may also contact Dr. Kristal Moore Clemons, the Principal Investigator/Doctoral Advisor at Northeastern University, Boston, MA by email: k.clemons@neu.edu.

If you have any questions about your rights in this research, you may contact Nan C. Regina, Director, Human Subject Research Protection, 960 Renaissance Park, Northeastern University, Boston, MA 02115. Tel: [redacted] Email: irb@neu.edu. You may call anonymously if you wish.

You are welcome to keep a copy of this form for your record.

Thank you very much,

Jack Nguyen, Doctoral Candidate  
College of Professional Studies  
Northeastern University
APPENDIX D

Intake Call and Interview Protocol

************************

Intake Call Script

Institution:
Northeastern University
360 Huntington Avenue; Boston, Massachusetts 02115

Call Date:
Interviewee:
Interviewer: Jack Nguyen
Location of Interview:

Good morning/afternoon (interviewee’s name),

Thank you for your interest in this study. My name is Jack Nguyen and I am a doctoral candidate at Northeastern University. I am a career educator and have been serving students with disabilities for nearly a decade including the past five years as the Alternate Media/Assistive Technology Specialist.

This research is being conducted as my doctoral dissertation. The goal of the study is to gain insights into the experiences of college students with print-related disabilities who overcome challenges while taking online/hybrid courses. From these insights, it is possible that we might discover feasible strategies to improve online learning experience for all students.

I will be conducting all intake calls and interview sessions as well as the main contact person should the interviewees have any questions about the study.

For today’s phone call, I would like to go over with you some very basic questions to determine if you would qualify as one of the participants of the study. If so, I will provide more details on the scope of the research and address any question you may have. After that, if you are interested in moving forward, we will set up appointments for the two interview sessions. Does that work for you?

• Are you currently enrolled as college student?
  o Are you registered with Disability Services for Students office on campus?
  o Are you qualified for alternate media and/or technology services?
• Are you currently or have enrolled in at least one online/hybrid course?
  o While taking this/these online/hybrid course(s), do you use any form of assistive technologies (give example: tech-to-speech, screen reader, voice recognition) to
access your online learning contents or navigating online learning environment (give example: Moodle, reading assignments posted on instructor’s websites)?

- This study aims to explore the challenges that students with disabilities overcome while they take online or hybrid courses. Do you share the same experiences?

Great! Thank you, (interviewee’s name).

I’m happy to say that you meet all of the criteria in regards to participation in this study. Now I would like to tell you a bit more about the scope of this project.

It is a narrative study and the main research question that will guide the study is “What are the difficulties that college students with disabilities have experienced when they navigate and access online instructional materials?” There will be two interview sessions. Each session takes about 60 to 90 minutes. I will reserve a study room at our library’s research floor. The first interview session focuses on demographic and background information of the participants such as their disabilities, their knowledge and skills of assistive technology. The second interview session focuses on the challenges that the participants have experienced as the results of inaccessible online learning contents and online learning environments.

Each participant will be assigned a pseudonym and all recorded responses kept anonymous so that identifying information would never be published. Participants who complete both interviews will receive a $25 gift card to Amazon.com, Apple Store, or iTunes in the mail within two weeks from the date of the final interview session.

Do you have any question for me? If not, are you interested in being one of the participants of this study?

Great, both interview session will need to take place within ten days. Let’s set up the appointments that work for both of us.

Thank you, (interviewee’s name). I will email you an electronic copy of the Consent Form. This form will explain a bit more about the study and answers some common questions people often have in regards to research. I would like to ask that you go over the information on this form before the first interview. If you have any questions or concerns, please feel free to contact me directly. The contact information will be listed on the form. We will go over the Consent Form together at the beginning of the interview. You will also have another opportunity to ask any questions. After that, if you decide to proceed with the interview, I will request to record your verbal consent for the record at that time. Does that work?

Thank you. Before we wrap up this call, I would like to ask if someone you know would like to participate or interested in learning more about this study, please call me directly at [redacted] or email me at nguyen.jac@husky.neu.edu.

I look forward to our first interview on (scheduled date). Thank you. Goodbye!
Interview Session #1

Interview Date: 
Interviewee: 
Interviewer: Jack Nguyen 
Location of Interview: 

Part 1: Introductory Protocol 

Good morning/afternoon (interviewee’s name). Thank you again for participating in this study. Before we begin, I would like to go over the important details of the process as listed in the Consent Form that I emailed you on (date of email).

The goal of the study is to gain insights into the experiences of college students with print-related disabilities who overcome challenges while taking online/hybrid courses. From these insights, it is possible that we might discover feasible strategies to improve online learning experience for all students. Obviously, your response is a very important part of this study and in order for me to ensure accuracy, I will record the interview sessions using my iPhone, my MacBook Pro laptop, and this Sony digital recorder. Next, I will hire a professional transcriptionist who is experienced in working with students with disabilities within higher education environments. The professional transcriptionist that I hire is required to sign a “Transcriber Confidentiality Statement in a Research Study” form. Your real name will not be used at any time.

Would you agree for me to start the recording now? Thank you!

(Recording begins)

I am obligated to fulfill the human subjects requirements by making sure that all participants read and verbally agree to the items on the Consent Form that I emailed you. I would like to go over this form with you now.

• There are no foreseeable risks or discomforts to you for taking part in this study.
• There are no direct benefits to you for participating in the study. However, your answers may help us to identify feasible strategies to improve online learning experience through addressing the issues pertaining to accessibilities. Also, if you complete both interview sessions, you will receive one $25 gift card to either Amazon.com, Apple Store, or iTunes in the mail within two weeks from the date of the final interview session.
• Your part in this study will be handled in a confidential manner. Only the researchers will know that you participated in this study. Any reports or publications based on this research will only use pseudonyms, and will not identify you or any other participants as being part of this project.
• The decision to participate in this research project is up to you. You do not have to participate and you can refuse to answer any question. Even if you begin the study, you may withdraw at any time.
• If you have any questions about this study, please feel free to contact me, Jack Nguyen, the person mainly responsible for the research, by phone at [redacted] or by email: nguyen.jac@husky.neu.edu. You may also contact Dr. Kristal Moore Clemons, the Principal Investigator/Doctoral Advisor at Northeastern University, Boston, MA by email: k.clemons@neu.edu.
• If you have any questions about your rights in this research, you may contact Nan C. Regina, Director, Human Subject Research Protection, 960 Renaissance Park, Northeastern University, Boston, MA 02115. Tel: [redacted], Email: irb@neu.edu. You may call anonymously if you wish.
• You are welcome to keep a copy of this form for your record.

Do you have any further questions or concerns about the research, the interview process, or this Consent Form?

May I have your verbal consent?

Great, thank you.

Today’s session is the first of two interview sessions. Our goal is to complete all questions and responses within the planned amount of time which is approximately 60 to 90 minutes. We will proceed with the second session within 10 days. Before I begin with the first interview question, do you have any further question for me?

Part 2: Biographical Interview Questions

The questions I have for this session will be about your biographical information. Your answers will help me create a detailed individual profile of you. I will use a pseudonym in place of your real name, of course.

1. Let’s start with the basic information about you. This section of the interview should take approximately 5 to 10 minutes. Please state your:
   • Age
   • Gender
   • Racial/ethnic identity
   • Degree program/major
   • Year in college (Junior, Senior, Graduate, etc.)
   • Registration status (Full-time, Part-time, Continuing)
   • Your current cumulative GPA

2. In this section, we will address the topics in regards to your disability and the academic accommodations you have while taking online/hybrid courses.
Disability and academic accommodations

- What is your diagnosed disability?
- When was your disability diagnosed/docuemented?
- What impact does the disability have on your online learning experience?
- While taking online/hybrid courses, what are the academic accommodations do you receive?
- Who do you consult with if you need assistants your academic accommodations?
- How do you inform your online instructor(s) of your documented disability?

3. Thank you. You are doing great, (interviewee’s name). In this section, we will focus on an overview of your assistive technology, alternate media usage. In addition, I have a few questions for you regarding the accessibility of online learning environment. Some of these questions are about your experience with the technology side of online learning. Please feel free to ask me for clarification. This section of the interview should take approximately 20 to 30 minutes. Are you ready?

Assistive technology

- Do you use any type of assistive technology?
- Which assistive technologies do you use?
- How often do you use assistive technology?
- How long have you been using these tools/software/hardware?
- Who do you contact if you need help/training/support with utilizing your assistive technology while taking online/hybrid courses?

Alternate media

- Which alternate formats do you use?
- How long have you been using this format?
- Do you need to use alternate media in all of your online/hybrid courses?
- How do you obtain alternate media?
- Who do you contact if you need help/training/support with utilizing your alternate media while taking online/hybrid courses?

Part 3: Wrap-up

Thank you, (interviewee’s name). You are doing great.
That was the last question I have for today’s session. Before we wrap up, do you have any questions for me or is there any further information you would like to add?

I want to confirm the time for the next/final interview: _______. Thank you so much for your participation and I will see you on _______ for the final interview session.
Interview Session #2

Interview Date:
Interviewee:
Interviewer: Jack Nguyen
Location of Interview:

Part 1: Introductory Protocol

Good morning/afternoon (interviewee’s name),
I really enjoyed the interview session with you last time. Your insights are very helpful for me as we continue with today’s session. In this session we will discuss your experience taking online/hybrid courses. The main objective is to document your stories in details with your voice.

Just like last time, I will start recording our conversation whenever you are ready. Are you ready to begin?

Part 2: Online Learning Experience

The online learning management system and learning contents

1. Let’s start with your experience with the online learning management system. What was it like when you navigate the online learning environment? What was your take on the structural elements such as the menu, links, or the search function?

   Possible follow-up/clarification:
   • Were you able to navigate the online learning management system or website with ease using your existing assistive technologies? (Perform tasks such as checking assignment due dates, finding and downloading course syllabus, podcasts, or weekly reading materials.)
   • Where do online course materials usually posted/stored? (LMS such as Moodle, Blackboard, instructor’s website, library’s website, other external websites, etc.)
   • What are the most common formats being posted? (PDF, Word, PowerPoint, MP3, streaming videos on YouTube or TED, etc.)
   • What about when it is time for exams? (Extended time, use of alternate media, other accommodations)

2. You mentioned that certain features/elements of the online course were difficult or even impossible to access. Could you tell me more about that?

   Possible follow-up/clarification:
   • Were you able to read contents from these files as they were posted without the need for additional support from the Disability Services for Students, friends or family members?
   • Were you able to interact with your instructor and classmates with ease using your existing assistive technologies? (Perform tasks such as posting responses in discussion board, sending emails, uploading assignments, etc.)
• Was close-caption available to all videos?
• Issues with scanned PDF/PowerPoint/other files?
• What would you consider to be the most challenging or most time-consuming task?

Participant’s experience as a student with disabilities taking online/hybrid course

3. For what reason did you take online/hybrid courses?
   Possible follow-up/clarification:
   • While taking online courses, what was your typical week like?
   • How often do you log on to the course module?
   • How long did it take you to complete the weekly reading, writing assignments?
   • In many cases, taking online courses means the students would do study and research on their own. What was your own experience like?

4. In addition to digital files, did your instructor also assign printed textbooks or course reader?
   Possible follow-up/clarification:
   • You have a documented print-related disability, how do you access these printed materials? (Printed materials being converted to alternate media, screen reader, text-to-speech software, magnifying tools, ask roommates or family members to read aloud, etc.)
   • How long does the process take to obtain full access of the contents?

5. Based on your experiences, do you feel like the online learning environment was designed to effectively accommodate your learning?
   Possible follow-up/clarification:
   • Do you feel like you receive the equal access to learning contents as your fellow classmates?
   • Do you feel like you receive equal access to all learning activities as your fellow classmates?

6. What would you like to change to make online learning environment more accessible?
   Possible follow-up/clarification:
   • Design of structural elements?
   • Format of learning contents?
   • Additional supports from instructor, Disability Services for Student, other?

7. Is there anything else you would like to add? Is there any additional question I should have asked?

Part 3: Wrap-up

Thank you, (interviewee’s name). That concludes the interview questions for this final session. I think we have covered all the topics. I believe that I have a solid amount of information but just
in case if I need to ask you for some clarification, would it be okay for me to contact you? Would you prefer e-mail or by phone?

Great! I will prepare the audio files for transcripts right away. As soon as the transcripts are ready, I will send the text files to you. You will have an entire week to get back to me with any feedback, amendment, or corrections.

Also, would you like to have your $25 gift card from Amazon, iTunes, or Apple Store?

The dissertation should be completed in less than 6 months from now. I will definitely keep you posted when it is available to the public.

Do you have any question for me?

Thank you again, (interviewee’s name) for taking part of this research. I really enjoyed working with you.
APPENDIX E

Northeastern

Notification of IRB Action

Date: April 24, 2015  IRB #: CPS15-04-05
Principal Investigator(s): Kristal Clemons
                        Jack Nguyen
Department: Doctor of Education
            College of Professional Studies
Address: 20 Belvidere
         Northeastern University
Title of Project: Inclusive Instructional Materials: A Narrative Study Examining
                 the Current Web-Based Learning Contents (WBLC) and Online
                 Learning Environments in Higher Education
Participating Sites: Sonoma State University Permission forthcoming
Informed Consent: One (1) unsigned consent

As per CFR 46.117(c)2 signed consent is being waived as the research presents no more than
minimal risk of harm to subjects and involves no procedures for which written consent is normally
required.

DHIS Review Category: Expedited #6, #7
Monitoring Interval: 12 months
Approval Expiration Date: APRIL 23, 2018

Investigator’s Responsibilities:
1. Informed consent form bearing the IRB approval stamp must be used when recruiting participants
   into the study.
2. The investigator must notify IRB immediately of unexpected adverse reactions, or new
   information that may alter our perception of the benefit-risk ratio.
3. Study procedures and files are subject to audit any time.
4. Any modifications of the protocol or the informed consent as the study progresses must be
   reviewed and approved by this committee prior to being instituted.
5. Continuing Review Approval for the proposal should be requested at least one month prior to the
   expiration date above.
6. This approval applies to the protection of human subjects only. It does not apply to any other
   university approvals that may be necessary.

C. Randall Colvin, Ph.D., Chair
Northeastern University Institutional Review Board

Nan C. Regina, Director
Human Subject Research Protection

Northeastern University FWA #4630
Certificate of Completion

The National Institutes of Health (NIH) Office of Extramural Research certifies that Jack Nguyen successfully completed the NIH Web-based training course “Protecting Human Research Participants”.

Date of completion: 11/06/2013
Certification Number: 1318747
REFERENCES


*Academy of Management Review, 36*(2), 247-271


Diaz-Greenberg, R., Thousand, J., Cardelle-Elawar, M., & Nevin, A. (2000). What teachers need to know about the struggle for self-determination (conscientization) and self-regulation:
Adults with disabilities speak about their education experiences. *Teaching and Teacher Education, 16*(8), 873-887.


