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Learning Disabilities and the Virtual College Campus: A Grounded Theory of Accessibility

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Abstract

Two trends currently impacting higher education intersect in this study: (1) students with learning disabilities are enrolling in colleges and universities in increasing numbers, and (2) colleges and universities are increasingly relying on the web to provide services to students. This reliance on the "virtual campus" comes without apparent consideration of accessibility issues that may be experienced by students with learning disabilities. This study explored the experiences of 16 college students, self-identified as having learning disabilities, as they interacted with the virtual campus of one college.

Consistent with the social model of disability, this study initially focused on the features of the virtual campus that were both helpful and not helpful to the informants as they performed eight tasks considered typical of those expected of a college student. Using a grounded theory methodology, the model that evolved from this data indicated that to understand the informants' experiences, consideration had to be given also to what the informants brought to the experience, including their active choice and use of helpful strategies.

The results of this study suggest that web accessibility as currently conceived is too limiting. A "one-size-fits-all" approach to universal access is unrealistic as users of the virtual campus bring varied strengths and capabilities as well as varied impairments to their interaction with web-based services. While colleges and universities are encouraged to follow current usability and accessibility principles, attention should also be given to the construction of a web-human interface that can be individualized to meet a user's specific needs.

LEARNING DISABILITIES AND THE VIRTUAL COLLEGE CAMPUS: A GROUNDED THEORY OF ACCESSIBILITY

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Dissertation
Submitted in partial fulfillment of the requirements for the degree of
Doctor of Philosophy in Instructional Design, Development, and Evaluation.

Syracuse University
May 2012

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Chapter I

Introduction

In this study, I explore the experiences of college students with learning disabilities as they interact with the online services provided by a college. This study is timely in that two trends currently impacting higher education intersect in this student-web interaction: (1) an increasing number of students with learning disabilities are enrolling in postsecondary education, and (2) colleges and universities are increasing their reliance on the web for provision of student services.

College Students with Learning Disabilities

Students with learning disabilities are enrolling in colleges and universities at an increasing rate (DaDeppo, 2009; Heiman & Precel, 2003). In 1988, one-percent of college freshmen at four-year institutions were identified as having a learning disability. This number grew to 2.4 percent by 2000 (Henderson, 2001) and to 3 percent by 2004 (U.S. Department of Education, National Center for Education Statistics, 2008). As more students with learning disabilities enroll in postsecondary education, it is important for colleges and universities to proactively provide services necessary for their success (Cole & Cain, 1996). Rodis, Garrod, and Boscardin (2001) warn administrators that colleges "cannot respond only to crises as they strike. Students with disabilities must be considered as valued members of the educational community" (p. 192). The result of such valuing is an inclusive educational community in which diversity is accepted, and all students benefit.

In addition to their specific learning impairments, students with learning disabilities face a number of challenges to successful participation in college life (Heimen & Kariv, 2004). For example, Zwart and Kallemeyn (2001), in a study of college

students with attention deficit hyperactivity disorder (ADHD) and learning disabilities, identified difficulties with study skills, note-taking abilities, and test-taking skills. Students with learning disabilities often deal with inadequate organization and time management skills (DeDeppo, 2009). Barga (1996) reported that students with learning disabilities experience labeling and stigmatization that often result in differential treatment by service providers and faculty. According to Barga, this stimatization is often forced on the students when they are required to disclose their learning disability to college personnel in order to receive the accommodations necessary for academic success.

Such challenges may be the cause of the higher dropout rate noted when comparing students with disabilities and students without disabilities. The U.S. Department of Education, National Center for Education Statistics (1999) indicated that of those students who enrolled in college for the first time during the 1989–90 academic year, 48 percent of students without disabilities but only 33 percent of students with disabilities had completed a bachelor's degree within five years. A similar discrepancy was found through the National Longitudinal Transition Study-2 which followed students with disabilities who were 13-16 years of age in 2000. Of those students with disabilities who enrolled in college, only 41 percent had successfully completed a college degree before they left college compared to 52 percent of students without disabilities (Newman et al., 2011).

Increasing Reliance on Web-Based Services

At the same time as students with learning disabilities are enrolling in college in increasing numbers, computer use on college campuses has expanded from specialized academic programs, such as computer science and graphic design, to use within educational and administrative operations (Oblinger & Katz, 2000). This expansion has led to the development of a "virtual campus" in which students conduct on the web many of the activities related to college attendance. While colleges differ in terms of how many services they provide online, registration into courses, completing financial aid forms, and checking end-of-semester grades are just a few of the administrative functions now provided on the web by many colleges and universities (Seale, 2006). Given the expectation that college students use the web for these administrative functions, it is important to know whether or not students with learning disabilities are successful in doing so. Yet there is limited research regarding the accessibility of such web-based services.

The most common learning disability experienced by college students is difficulty with reading comprehension (Gjajria, Jitendra, Sood, & Sacks, 2007). Information provided on the web is presented primarily in a text-based format which students must read in order to interact with that information. It seems likely to me that many students with learning disabilities could be experiencing difficulty in accessing and using the web-based services provided by colleges. With the potential legal, pedagogical, and ethical issues that can arise when services are inaccessible to individuals with disabilities, this current study is important to institutions of higher education.

While the population of interest to this study is students with learning disabilities, there is little known about the usability of the virtual campus for any student (Seale, 2006). The argument advanced by advocates of universal design is that when environments are made accessible for one group of individuals, usability by other groups also improves. Universal design was originally espoused by architects for physical environments. Within the physical environment, the most frequently cited example of universal design is the curb cut, originally intended to improve mobility for individuals using wheelchairs but which also increases mobility for mothers using strollers, skaters using roller blades, and individuals using carts (Roberts, Park, Brown, & Cook, 2011). It may be that by applying universal design principles to the virtual campus, colleges and universities will be able to address accessibility for students with disabilities, but also improve the usability of their services for all students.

Similarly, universal design principles would suggest that when building accessibility into the web for one group of individuals with disabilities, lessons can be learned that will improve accessibility for other groups with disabilities. For instance, individuals using screen readers because of visual impairments can more easily navigate through online information when web designers organize that information by using heading levels. Organization by headings also provides an external organizational scheme that may be helpful for individuals with reading disabilities. Cluttered web pages that interfere with efficient reading by individuals with reading impairments, may also distract individuals with attention disorders (Crow, 2008).

The curb cut example, however, also points to one of the criticisms of universal design. Features that improve accessibility for one group of individuals may decrease

accessibility for another. Curbs are used by individuals with visual impairments as a cue for mobility (tapping with a cane). With curb cuts, this cue was removed (O'Leary, Lockwood, & Taylor, 1996)). On the web, screens that present information only through text increase access for individuals with visual impairments using screen readers, but may decrease accessibility for individuals with learning disabilities who benefit from a multi-sensory approach to reading (Guyer & Sabatino, 1989; Oakland, Black, Stanford, Nussbaum, & Balise, 1998). Guidelines being developed for web accessibility, using the paradigm of universal design, may not be sufficient to address accessibility for all.

Accessibility and Usability

While the distinction between usability and accessibility is often blurred, the following definitions are provided by Henry (2003) and will be used in this study:

- *Usability* refers to the characteristics of a website that make it effective, efficient and satisfying to the user. Usability problems impact all web users regardless of ability.
- *Accessibility* refers to the characteristics of a website that allow individuals with disabilities to access information and services. Problems with accessibility place individuals with disabilities at a disadvantage relative to individuals without disabilities.

Literature on accessibility of the web in general can be found, however, consideration of accessibility issues in the context of higher education is still relatively uncommon (Henry, 2003; Seale, 2006). Consideration of accessibility of web-based services provided by institutions of higher education is critical from a number of

perspectives: (1) pedagogical, (2) legal, (3) business, and (4) social justice. Each of these perspectives is further discussed below.

From a pedagogical perspective, the evolution from face-to-face classroom learning to online learning is accompanied by a paradigm shift in the way college instructors go about the task of teaching. A number of authors have written about the role change from instructor to facilitator that is necessitated by this shift (Simonson, Smaldino, Albright, & Zvacek, 2006; Vogel, Leyser, Wyland, & Brulle, 2000). One factor that has not changed is the instructor's responsibility for ensuring that all students, including those with disabilities, have access to course materials (Boyd & Moulton, 2004).

From a legal perspective, colleges and universities are required to comply with a number of federal guidelines on accessibility. Laws which impact postsecondary institutions in the U.S. include the American with Disabilities Act of 1990 (ADA), Section 508 of the Rehabilitation Act of 1973, as amended in 1998, and Section 504 of the Rehabilitation Act of 1973. These laws, discussed in more detail in *Chapter 2*, require that colleges and universities assume responsibility for ensuring accessibility of their services to students with disabilities (Yu, 2002).

From a business perspective, accessible websites allow exposure to an increasingly large market of users with disabilities. Of the 291.1 million people in the U.S. in 2005, 54.4 million or 18.7 percent indicated they had some level of disability (Brault, 2008). Given the number of individuals with disabilities, Seale (2006) expressed amazement that more businesses aren't aware of, or responsive to, accessibility issues related to their web presence. Marketing of post-secondary education to students with

learning disabilities may be a potentially lucrative market for colleges and universities, but only if these students perceive the campus as accessible. Given that the website is often the first contact these potential students have with a college, accessibility may be critical in providing a positive first impression.

I am most interested in the social justice perspective. Access to information has become an increasingly important tool for success in our society. The ability to access information readily and rapidly via the web therefore provides an advantage to those who have such access. Web accessibility is therefore a civil rights issue (Yu, 2002). Foley (2007) states "techniques and technologies involved in making content accessible benefits the broader population, but the real motivation for web accessibility initiatives should be informed by a desire to provide access to those previously denied" (p. 25).

While online education has its skeptics who suggest it may foster social isolation (Bibeau, 2001), online education may also open the door to opportunities for individuals whose disabilities have prevented them from traveling to classes, participating in class discussion, or using obvious accommodations such as personal attendants. Learners with disabilities appreciate the fact that within the online environment, they are valued for their thoughts during a discussion and/or their contributions to a group project rather than stigmatized by their disability (Boyd & Moulton, 2004). Online communication, often a strong component in online education, allows an individual to share thoughts without the user on the other end knowing anything about the individual's race, gender, age, or disability. In order for the learner with a disability to benefit from these advantages, however, the environment must be accessible.

It should be noted that due to the lack of research on college students with learning disabilities within the online environment, it is unknown if these advantages apply to them. For students with learning disabilities, the online environment is an environment in which impairments in spelling, reading, vocabulary, and organizing language may be more obvious than in the face-to-face environment.

Need for this Study

Web designers have numerous guidelines available to assist them in making web-based services accessible for individuals with disabilities. Some of these guidelines are specific to an individual group of users or to a specific technology. For example, the National Instructional Materials Accessibility Standards (NIMAS) are used to guide the production of print publications in a format that allows for use by assistive technology (National Center on Accessible Instructional Materials, 2011). Other guidelines apply to specific entities such as government agencies and businesses. For example, the State of Illinois provides an extensive list of standards applicable to the web-based services provided by its government agencies and state schools (Illinois Department of Human Services, 2012). IBM provides guidelines for its employees through its *Web checklist* (IBM Human Ability and Accessibility Center, 2011).

The two most well known guidelines include the Web Consortium Accessibility Guidelines 2.0 (World Wide Web Consortium Web Accessibility Initiative, 2008) and guidelines based on Section 508 of the Rehabilitation Act Amendments of 1998 (Architectural and Transportation Barriers Compliance Board, 2000). However, these guidelines address only superficially the accessibility needs of individuals with cognitive and learning disabilities. Friedmen and Bryen (2007) indicate that the lack of guidelines

addressing the needs of this population can be attributed to several factors: (1) individuals with cognitive and learning disabilities have diverse needs, making one-size-fits-all guidelines difficult to write, (2) individuals with cognitive impairments are less apt to participate in research due to the social stigma attached to limitations of cognitive function, (3) individuals with cognitive disabilities are slower to adopt and use information technologies, and (4) individuals in this disability category experience lower expectations of their abilities and therefore less attention by web designers.

Authors that provide suggestions for improving web accessibility for students with learning disabilities base those suggestions on research findings related to text-based learning materials and face-to-face learning environments (Burgstahler, Corrigan, & McCarter, 2004). It is unknown to what extent these suggestions are valid when applied to text presented online. In addition, the web provides information not just through text, but also through a full array of features (graphics, video, sound). While multisensory and therefore perhaps beneficial to students with learning disabilities, the accessibility of such features is simply not known.

Conceptual Framework

Legal and business perspectives as well as pedagogical perspectives on accessibility are important; however, it is issues of social justice that have influenced my choice of this study's conceptual framework as well as guided the choice of study methodology. Issues of social justice are most clearly articulated in the disability studies literature. Heyer (2007) describes disability studies as a field that "invites scholars to think about disability not as a question of medical cures or rehabilitation but as a social category on par with race, gender, class, and sexual orientation" (p. 263).

Authors writing in the field of disability studies advocate for the social model of disability. They frequently describe the social model by comparing it to the medical model of disability (Shakespeare, 2006). The medical model of disability focuses on the individual's deficit or impairment, identifying ways in which the impairment can be cured or fixed. According to Linton (1998), the medical model contributes to the stigma and marginalization of individuals who have a disability because of its underlying assumption that because these individuals need fixing, they are not "normal."

In contrast, the social model focuses on how the individual experiences everyday activities within a disabling environment (Davidson, 2006). The social model views disability as a "product of negative attitudes and systemic discrimination that result in system-wide barriers to information, communication, and the physical environment" (Heyer, 2007, p. 265). Given an ideal or enabling environment, individuals with disabilities can participate fully in life's experiences. Given that the barriers to participation are created by society according to this model, Linton (1998) points out that it is a societal responsibility to address them.

Heyer (2007) further states that viewing disability from a social model perspective requires questioning current social processes and structures in order to identify when and in what way they are not fully responsive to the needs of individuals with disabilities. This study, based on the social model of disability, asks if the processes and structures of the virtual campus adequately accommodate to the needs of students with learning disabilities, allowing them access to the services and information they need, when they need it, in order to participate fully in the college experience. It is my hope to

add to the disability studies literature by focusing on a population not well represented in that literature.

My initial focus was on exploring the enabling and/or disabling nature of the virtual campus. In this study, I found task performance was indeed influenced by the requirements (process) of the task as well as the features (structure) of the virtual campus. As this study progressed, however, it became important to my understanding of accessibility to also explore the informants' agency in their interactions with the virtual campus. Task performance, while influenced by the structure and processes of the virtual campus, was also influenced by both the informants' individual differences and their learned behaviors and strategies to deal with those individual differences within the virtual campus. In the chapters that follow, the requirements of the online tasks performed by the informants, the features of the virtual campus that impacted performance, the behaviors demonstrated by the informants while performing those tasks, and the interaction of task, virtual campus features, and informant behavior are described and analyzed.

Overview of the Study

Setting of this study. A college in the northeast U.S. was the setting for this study. Enod Finely University, hereafter referred to simply as EFU, is a private, not-for-profit comprehensive university that enrolls approximately 2500 full and part-time undergraduate students, and 600 full- and part-time graduate students. In the past 10 years, EFU has purposefully built its virtual campus as a means of both attracting and retaining students (Kidwell, Mattie, & Sousa, 2000). At the time of this study, EFU offered ten academic online programs. Many of the students enrolled in those ten programs lived geographically separate from the physical campus requiring that business

services such as registration and financial aid counseling be provided through the virtual campus.

These web-based services, developed in response to the needs of online students, have evolved so that they are now offered also to students enrolled in on-ground programs. For instance, online registration has been available to all EFU students since the spring semester of 2009. Mailing of grade reports was replaced with online access in the fall of 2008. These online services are relatively new, and face-to-face help for almost all such services is still offered. EFU has an expressed plan to move toward limiting face-to-face services as a way to manage financial and operational costs, attract technologically-savvy students, and manage the increasing number of off-campus students and faculty who do not, or cannot, use face-to-face services. As is noted in higher education in general (Wallhaus, 2000), EFU is still struggling with providing these services in an efficient and effective manner.

A complete usability and accessibility assessment was not carried out on the EFU website. A general overview suggests that for the most part, usability principles are followed, an impression verified by interview with the EFU web developer. Although EFU has no policy directly related to accessibility of web services, the web developer at EFU has an understanding of accessibility (J.P., personal communication, Feb. 1, 2012). It should be noted, however, that most webpages are under the control of staff from various offices with unknown awareness of accessibility. An automated check of accessibility using WAVE, a web-based accessibility checker (WebAIM, 2012) was performed on those pages most frequently accessed by informants in this study. There were no accessibility errors on most pages with one error found on the bookstore page

and five errors found on the library homepage. The bookstore had a missing url address in the long description for an image. The library homepage includes five search boxes, none of which had labels provided that could be read by a screen reader. Neither of these errors influenced informants' performances during this study. I have provided a representation of the EFU webpage layout in Figure 1 below. This layout is consistent between most pages on the EFU website.

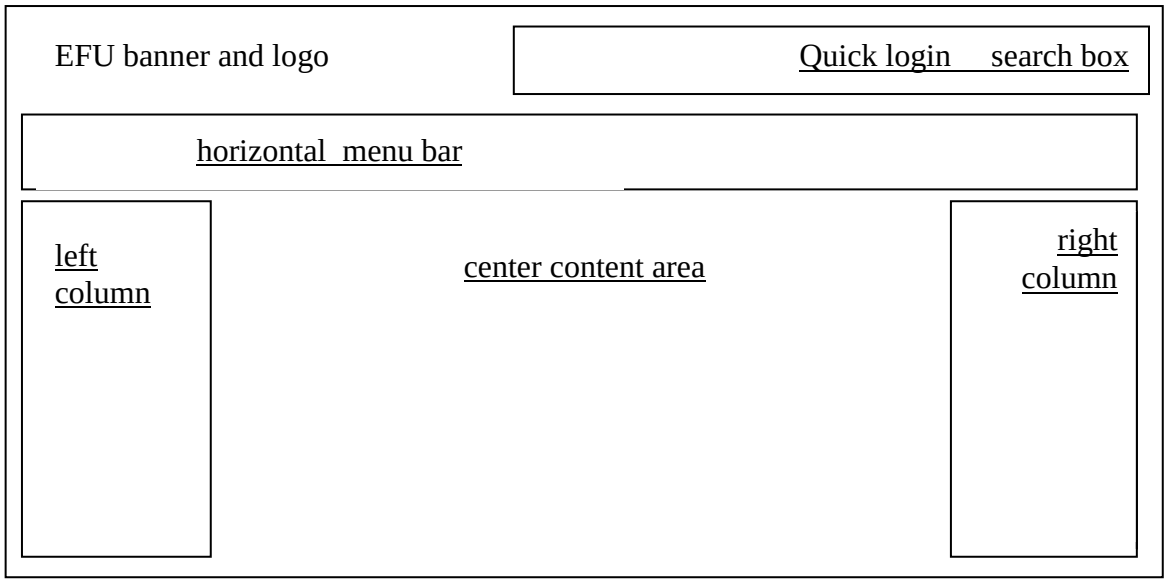


Figure 1. Representation of EFU Webpage Layout.

Design. Given the importance of web accessibility from a pedagogical, legal, business, and social justice perspective, an understanding of students' accessibility experiences is important to the higher education community. However, I found little literature addressing the online experiences of college students with learning disabilities, and no indication that any problem exists with accessibility of the virtual campus in terms of meeting the needs of these students. This paucity of literature prevented me from

selecting relevant variables to study based on a review of previous research. I therefore felt an inductive approach to this study was necessary in order to discover those variables.

While many inductive approaches result in a rich description of the phenomenon being studied, it was my intention to move beyond description to propose variables and hypotheses that will guide further research. Given the purpose of this study and the need to develop theory rather than test it, I chose a grounded theory methodology (Glaser & Strauss, 1967). The strength of this methodology is its ability to generate core constructs and relationships, firmly grounded in collected data, that form the basis for the development of testable hypotheses for future study (Glaser & Strauss, 1967).

Glaser (1992) describes a four-stage process for grounded theory research (see Table 1). In early stages, data is collected and coded using an increasingly selective process in which analysis of data collected in one stage informs data collection and coding in the next. Literature, considered a type of data, is reviewed in later stages to provide a context for data analysis. As theoretical constructs emerge during data analysis, data collection tasks may be revised, added, or deleted to ensure that conceptual "saturation" has been reached. Saturation is reached when no new properties or dimensions of the concepts emerge from the data (Glaser, 1978). Note that GTM involves opportunities for analysis throughout. This methodology can be seen to use an iterative reasoning process moving from inductive to deductive through the process of constant comparative analysis. Both grounded theory methodology and the process of constant comparative analysis are described in more detail in *Chapter II.*

Table 1

Four Stages of a Grounded Theory Study

Stage One	Stage Two	Stage Three	Stage Four
Collect data Constant comparative analysis - initial generation of codes Theoretical memos are written related to ideas/thoughts that occur to the researcher during analysis Data collection procedures are revised as necessary to inform emerging conceptual understanding	Collect data Coding - using initial as well as emergent codes Combine codes into categories Identify the properties of categories Continue writing theoretical memos Begin reading - literature serves as a type of data Revise data collection procedures if necessary	Collect data Selective coding process – based on emergent categories Continue writing theoretical memos Continue reading literature Evaluate emerging theory for consistency with data	Rework categories until all data is accounted for Continue writing theoretical memos – sorting and integrating them into the developing theory Use literature to elaborate on categories as relevant Continue to evaluate emerging theory

Data collection. Glaser (1992) states that both quantitative and qualitative data collection methods can be used when implementing a grounded theory study. The choice of grounded theory methodology therefore allowed me to explore a number of data collection methods in order to choose one that would best fit the purpose of this study. I chose to use direct observation of student-web interaction while engaging the informants in a “think-aloud” strategy. This think-aloud strategy is advocated as a data collection method in usability testing of software and webpages (Rubin, 1994). In such testing,

individuals representative of potential users interact with the software and simultaneously describe their experience to the web designer sitting beside them.

This think-aloud protocol results in the identification of issues that impact both positively and negatively on the users' interactions. While the literature defines usability and accessibility differently (see above), they are related and a data collection method based on usability was therefore felt to be appropriate when exploring the accessibility of the virtual campus.

This combination of observation and informant interview was also attractive in terms of my intent to place this study within the field of disability studies. Authors writing in the field of disability studies advise researchers to listen to individuals with disabilities as they describe their experiences, validating those experiences by using their own words (Linton, 1998).

Research Question

Glaser and Strauss (1967) and Glaser (1978, 1992) caution researchers using a grounded theory methodology to enter the field without predetermination of codes or possible hypotheses. This makes logical sense given that the findings or results of a grounded theory study are those same codes and hypotheses. To determine them *a priori* would bias the study, potentially causing the researcher to force the data to fit the hypotheses rather than ground the hypotheses in the data.

The possibility of bias is a weakness of the grounded theory approach and the topic of Glaser's *Basics of Grounded Theory Analysis: Emergence vs. Forcing* (1992). Glaser suggests two strategies to avoid bias. First, he cautions the researcher to avoid the traditional literature review that might result in the adoption of codes and hypotheses

based on the literature rather than data. This strategy has been addressed in *Chapter II*. Second, Glaser (1978, 1992) directs the grounded theory researcher to start with "neutral" questions, or questions that are open-ended without a basis in any underlying assumptions. Once the data analysis process has begun, questions are allowed to become more specific in response to the results. Glaser's direction was followed in the development of the research questions that guided this study. While the over-arching research question remained unchanged from the initial study proposal, the secondary questions were revised during the data analysis process. For this reason, only the initial research question is provided here. The revised secondary research questions will be introduced as the analysis leading to their development is discussed.

Overarching question. How do college students with learning disabilities experience services provided by a virtual campus? The following definitions are important to an understanding of this question:

- *Virtual campus* is defined as the web-based presence of a college or university, accessed and used by the students of that institution, in order to carry out academic and business functions necessary for participation in college life. While institutions of higher education also provide numerous web-based services for faculty and staff, it was not the intent of this study to examine those services.
- *Disability*, according to the World Health Organization (WHO) (2001), "is a complex phenomenon, reflecting an interaction between features of a person's body (impairments) and features of the society in which he or she lives" (para. 2). This definition sits somewhere between the medical model and social

model of disability, acknowledging the impact of both an individual's condition and the social/physical environment on his/her participation in daily activities.

- *Students with learning disabilities* refers to those students who experience a difference in the way they learn. For the purpose of this study, informants were considered to have a learning disability if they had submitted documentation of their learning disability to the EFU Disability Office. This documentation is legally mandated in order for students to receive accomodations for their disabilities. Using an already identified sub-population of college students was helpful in terms of recruitment of participants. I am aware that given the WHO (2001) definition of disability, it is not accurate to describe students' learning differences as disabilities; they should be referred to as impairments. However, the term "learning disability" is prevalent in the literature and to switch back and forth from disability to impairment is felt to be potentially confusing to the reader. I have therefore chosen to retain the term learning disability in the first chapters of this report while the literature is being reviewed to refer to the learning impairments or differences that these students experience.

Summary

Colleges and universities are moving toward the creation of virtual campuses in which students must access not just online classrooms, but also a full range of online administrative and business services as well. This movement toward a virtual campus comes at the same time as an increasing number of students with learning disabilities are

entering higher education. Colleges and universities are slowly beginning to address issues of accessibility to the virtual campus (Seale, 2006); however, much of the research in this area addresses accessibility of online education, rather than accessibility of online services such as those that are the focus of this study.

The importance of this study can be seen in the pedagogical, legal, business, and social justice arguments for accessibility that have been summarized above. Of most interest to me is the social justice argument, an interest consistent with the literature being written in the field of disability studies. The paucity of literature regarding the experience of students with learning disabilities with the virtual campus, or with web-based services in general, argued against a deductive approach and the inductive approach, grounded theory, was chosen to explore accessibility of the virtual campus.

Organization of this Report

In *Chapter II*, I review the literature that informed the proposing of this study. In this review, literature related to learning disabilities and specifically college students with learning disabilities is discussed. Accessibility and usability are further described. I provide a more complete overview of the social model of disability. I also include more description of the grounded theory methodology. As discussed above, Glaser (1992) cautioned the grounded theory researcher to enter the field without the typical review of literature which can result in a bias that forces the data to conform to prior conceptions. *Chapter II* is therefore limited in scope. In a grounded theory methodology, literature becomes data in later stages of analysis. I therefore discuss the literature used to inform the analysis in those chapters where the results are described.

In *Chapter III*, I provide a description of how I implemented the grounded theory methodology and describe and justify my choice of data collection methods.

In *Chapter IV*, I present information on the study informants including self-descriptions of their learning disabilities.

In *Chapter V*, I describe the analysis method I used in this study. I also provide an overview of the task framework that emerged from my initial analysis of task performance, and which I used to organize further analysis.

In *Chapter VI*, I describe the elements of the virtual campus that both helped and hindered successful task performance.

In *Chapter VII*, I describe those factors related to the informants that both helped and hindered successful task performance.

Finally, in *Chapter VIII*, I provide a summary and discussion of the results, concluding by identifying implications of those results for faculty, staff, and administrators of institutions of higher education, information technologists, students with learning disabilities, researchers, and disability advocates. I also propose several hypotheses for further research.

Chapter II

Literature Review

Introduction

In *Chapter I,* I identified the phenomenon of interest to this study as the experiences of students with learning disabilities as they interact with web-based services or virtual campus of a college. I indicated that I had chosen to place this study in the field of disability studies. In this chapter, I review what is being written in the field of disability studies in general and specifically in terms of learning disabilities. I felt this review was necessary in order to firmly ground this study in both the ways of thinking about disability and the ways in which research was being conducted in this field. I also review literature related to learning disabilities as well as literature related to college students with learning disabilities to provide the background necessary to understand the experiences of these students within the college environment. I provide a general overview of the literature on accessibility and usability including general guidelines for design of web services. I also include a more detailed description of the grounded theory methodology.

I used the scarcity of literature dealing with accessibility of the virtual campus as a justification for the choice of the grounded theory methodology for this study. In planning a grounded theory study, the researcher enters the field without the typical review of literature carried out prior to most research studies (Glaser,1992). This typical review can result in a bias that forces the data to conform to prior conceptions. As the study progresses, literature is used as data to help in the analysis process. It is the literature reviewed prior to implementation that I synthesize in this chapter. Literature used during the analysis is presented in the remaining chapters.

I retrieved literature for this review using multiple databases available through the Syracuse University library system including ERIC, Education Full Text, PsycArticles, PsycINFO, Social Sciences Full-Text, and Sociological Abstracts. In addition, I searched databases provided by the EBSCO Host database system available through the EFU library. I used variations and combinations of the following terms in that search: disability studies, learning disability, college student, college services, web-based services, computer, accessibility, usability, and human-computer interaction. I identified a number of texts using the Syracuse University electronic library catalog and a similar keyword search. Due to the rapid changes occuring in the web and computer-based studies in general, I limited the search related to web-based services, computer, and human-computer interaction to literature published since January, 2000. Information on other topics was not limited by date of publication. I searched the Internet using Google to obtain up-to-date information regarding web accessibility standards and guidelines. All literature was written in English, and articles were further limited to peer-reviewed journals. I used the reference lists of relevant texts and articles to identify additional sources of literature.

I carried out a search for literature related to the grounded theory methodology using the keyword phrase “grounded theory” in both the Syracuse University electronic databases and the Syracuse Library electronic catalog. Because this methodology was developed and promoted by Barney Glaser and Anselm Strauss, I further searched by the names of these two authors to identify additional works. I reviewed a number of texts to provide guidance related to qualitative research methods.

In the review that follows, I begin with a brief discussion of the virtual campus. I discuss disability studies and the social model of disability. I review the literature related to learning disabilities in general and college students with learning disabilities specifically. I discuss issues related to the concept of accessibility with a focus on how that concept applies to individuals with learning disabilities and to the virtual campus. I discuss laws and guidelines applicable to accessibility of the virtual campus. I conclude this chapter with a description of the grounded theory methodology. Glaser (1978) advises the grounded theorist to develop a theoretical sensitivity to the methodology, particularly in terms of the analysis of data. Toward this end, a number of studies completed using the grounded theory methodology were reviewed and information from these studies has been used in this chapter as exemplars of the methodology.

Virtual Campus

Interaction of the college student with the web encompasses more than just online learning. Colleges and universities typically have a web-based presence or virtual campus that is necessary for students to access in order to take advantage of online learning resources (e.g., library, supplemental class materials) as well as take care of various business operations such as registering for classes or buying textbooks (Oblinger & Katz, 2000).

The choice of the term, virtual campus, reflects the fact that colleges are changing in ways that make consideration of the virtual environment as important as consideration of the physical environment. Classrooms with lecterns have been supplemented or replaced by web-based course management systems that deliver electronic versions of lectures, handouts, and discussion groups. Standing in line to purchase textbooks at the

college bookstore has been replaced by an online purchasing system that allows for delivery of books to the student's residence. Within a few years, the book itself may be replaced by an electronic copy (Oblinger & Katz, 2000). The increasing number of students opting for online distance education suggests that the constraints of the physical environment, inherent to traditional on-ground college courses, may be a barrier to participation. For online students who do not step foot on the physical campus the virtual campus must meet all their needs. Access to the virtual campus is not just desirable but necessary for full participation in the college experience (Wallhaus, 2000).

In 2000, Kidwell, Mattie, & Sousa identified four forces driving increased use of the Internet by colleges and universities: (1) the Internet has become a familiar and popular means of obtaining information and services; (2) students and their families are becoming increasingly demanding, looking to higher education for the same expedited services via the Internet that are being offered by other businesses; (3) in a tight financial climate, colleges and universities are exploring the cost-containment opportunities provided by Internet based applications; and (4) the Internet provides opportunities for entering new markets and diversifying revenue streams.

Disability Studies and the Social Model of Disability

In a 1998 essay, Linton described disability studies by comparing it to "not-disability studies." The focus of not-disability studies is on the individual for whom disability is seen as a problem, frequently communicated through a label such as a medical diagnosis or educational classification. This perspective is most frequently an interventionist perspective in which health care and educational professionals ask what intervention has been scientifically proven to solve the individual's problem or fix his/her

disability (Danforth, 1999). This view has been termed the medical model of disability and implies that the individual is not "normal," that the individual desires to be "normal," and that the role of society is to provide the tools and technology needed for fixing the problem so that the individual can be "normal." In not-disability studies, the voice of individuals with disabilities is poorly represented. The literature is written *about* (author's emphasis) individuals with disabilities, not written *by* or *with* (author's emphasis) individuals with disabilities (Linton, 1998).

In contrast, disability studies is a "socio-political-cultural examination of disability" (Linton, 1998, p. 525). The focus of this interdisciplinary field is not on the individual but rather on the societal forces that act as barriers to an individual's participation in daily life activities. In the social model of disability, the environment is considered disabling when an individual is not able to participate in life's activities within that environment. Intervention is not aimed at the individual but rather at facilitating change in environmental structures and processes so that all individuals can participate fully within that environment. Three major themes can be identified in the literature written in the disability studies field: (1) disability is a social construction, (2) disability is a normal human variation, and (3) the "voice" of individuals with disabilities is necessary in order to "deconstruct" this social construction or understanding of the term "disability" (Denhart, 2008, p. 484). Each of these themes is discussed below as they relate to this study.

The role of language is to convey meaning and is therefore an inherently social activity. The way in which something is described or labeled determines the way it is thought about, making for the construction of a shared or "social" meaning (Siebers,

2001). Concern with language and the social construction of disability is found in the works of many who write in the disability studies area (Lane, 1995; Linton, 1998; Siebers, 2001; Titchkosky, 2007). "Learning disability" is a socially constructed label that conveys the message there is a standard way in which individuals should learn (Bricout, 2001; Rodis, Garrod, & Boscardin, 2001). Students who do not seem to learn from the standard or typical educational experience are labeled learning disabled and often perceived by educational personnel as having a problem that needs fixing, a view consistent with the medical model of disability. Unfortunately, labeling students as learning disabled is a form of categorization which frequently leads to social injustice (Reid & Valle, 2004).

According to the social model, disability is a normal human variation much like being left-handed. While the variation is inherent to the individual, disability results only when social processes and structures are unable to accommodate to the variation as when only right-handed scissors are available in the classroom (Reid & Valle, 2004). It is hoped that as social institutions become more sensitive and attuned to these variations, practices will become more equitable. Until then, policies that address disability rights are necessary to ensure equitable and socially just services (Schriner & Scotch, 2001). Given that disability is a normal variation, the role of educational institutions should be to provide classrooms in which instructional approaches also vary, allowing for optimal learning by all students. The goal should be to design a context that is welcoming to all human variations including learning disabilities (Reid & Valle, 2004).

Literature written in the area of disability studies emphasizes, encourages, and focuses on the "voice" of individuals with disabilities. Authors, who openly

acknowledge their disability label, write much of this literature providing a needed and often neglected perspective. One perspective that is still missing in the literature is that of individuals with learning disabilities. Scholars identifying themselves as learning disabled are few (Denhart, 2008) most likely due to both the stigma attached to acknowledging a learning disability as well as lower rates of participation by individuals with learning disabilities in higher education.

Given my interest in accessibility from the perspective of social justice, I felt that the social model of disability was most appropriate when looking at the accessibility of web-based college services. The virtual campus is a social institution with structures and processes that must be attuned to the normal variations inherent in all college students if full participation in college life is the goal. Furthermore, in order to become sensitive to those variations, the voice of these students must be sought out and heard.

History and Definition of Learning Disabilities

Hallahan and Mock (2003) indicate that the term learning disability was first used in 1962 by S.A. Kirk in his publication, *Educating Exceptional Children*. Kirk indicated that children who were learning disabled were children who demonstrated delayed development in speech, language, reading, writing, arithmetic and/or other school subjects. Further, this delay was caused by possible cerebral dysfunction, emotional, and/or behavioral disturbances and not attributed to mental retardation, sensory deprivation, or factors related to cultural or instructional factors. In 1965, Bateman added to this definition by introducing the concept of discrepancy between aptitude (an estimation of achievement based on inherent factors) and achievement (actual school performance) to define learning disability (Hallahan & Mock, 2003).

In the late 1960s, the federal government sponsored two separate task forces, asking each to define learning disabilities. The first task force, comprised primarily of physicians, focused on the neurological aspects of learning disabilities. Preferring to use the term "minimal brain dysfunction," this task force emphasized the neurological and/or medical cause of learning disabilities in their definition. The second task force, comprised primarily of educators, was unable to come to consensus and adopted two different definitions. The first definition was similar to Kirk's in that it emphasized the delay in one or more abilities. The second definition was similar to Bateman's in that it emphasized the discrepancy between aptitude and achievement (Hallahan & Mock, 2003).

In 1975, the Education for All Handicapped Children Act (EAHCA) was signed into law. The U.S. Department of Education, in implementing the EAHCA, provided the following definition of learning disability:

> The term "specific learning disability" means a disorder in one or more of the psychological processes involved in understanding or in using language, spoken or written, which may manifest itself in an imperfect ability to listen, speak, read, write, spell, or to do mathematical calculations. The term does not include children who have learning disabilities, which are primarily the result of visual, hearing, or motor handicaps or mental retardation, or emotional disturbance, or of environmental, cultural, or economic disadvantage (U.S. Department of Education, 1977, p. 65083, as cited by Hallahan & Mock, 2003).

Despite the 20-30 years of research in the field of learning disabilities since the EAHCA definition of learning disability was written, this definition was included essentially unchanged when the Individuals with Disabilities Education Act (IDEA) was reauthorized in 1997 and again in 2004 (U.S. Department of Education, 2004).

Hallahan and Mock (2003) describe early research in the area of learning disabilities. This description indicates that this early research was most closely aligned with the medical model of disability. This research and view of learning disabilities influenced the legislative definition of learning disabilities, which in turn determined, and continues to determine, the nature of services that are provided to students (Seale, 2006; Sleeter, 1986). It is beyond the scope of this literature review to provide a full historical account of the research related to learning disabilities, however, Kavale and Forness (2003) summarized the research carried out between 1960 to the present, identifying two separate perspectives, roughly consistent with the medical and social models of disability. They called these two perspectives the scientific and political disciplines. These terms are themselves a social construction and provide a window into Kavale and Forness' perspective on the purpose of research carried out in each of these two schools of thought.

College Students with Learning Disabilities

Shaw and Dukes (2005) indicate that students with disabilities "have made significant strides toward fulfilling their expectation to be integrated into adult life" (p.10). They have not yet, however, caught up with their non-disabled peers in terms of enrollment or graduation from post-secondary education (DaDeppo, 2009). Nor has this

success been accompanied without effort and struggle (Denhart, 2008; Heiman and Precel, 2003).

Although institutions of higher education are seeing an increase in the number of students with disabilities, these students continue to enroll at a rate less than their non-disabled peers. According to the National Center for Educational Statistics, the rate of postsecondary enrollment for all high school graduates was approximately 67 percent in 1997, fluctuating between 64 and 69 percent since 2002 (U.S. Department of Education, National Center for Education Statistics, 2008). In comparison, the National Longitudinal Transition Study–2 found that only 45 percent of students with disabilities attended college within four years following high school graduation (Newman et al., 2009).

Statistics are less clear in regards to how many of these students with disabilities persist to college graduation. The Beginning Postsecondary Students Longitudinal Study surveyed a sample of students enrolling in college for the first time during the 1989-1990 academic year. This cohort was surveyed again in 1992 and 1994. Of students without disabilities, 64 percent had graduated during this time frame. In contrast, only 53 percent of students in the cohort who were identified with any disability had persisted and graduated from a postsecondary program (U.S. Department of Education, National Center for Education Statistics, 1999). It is unknown what percentage of these students were students with learning disabilities although studies indicate that students with learning disabilities make up the largest percentage of college students identified with a disability. The number of students in postsecondary institutions who identify themselves as having a learning disability ranges between 8 percent and 16 percent (Seale, 2006).

A number of studies have looked at the academic performance of college students with learning disabilities. Academic achievement of college students with learning disabilities, as measured by grades and G.P.A., are similar to those of students without learning disabilities (Heiman and Precel, 2003; Jorgenson et al., 2005). Given the academic difficulties that define learning disabilities, this finding is somewhat surprising. Heiman and Precel (2003) attributed the similar level of achievement to the intense effort exerted by students with learning disabilities as well as the support services and accommodations provided to these students. Jorgenson et al. (2005) came to a different conclusion when they compared archival data to describe the outcomes of students with learning disabilities (n = 653) to students without learning disabilities (n = 41,357) at a large mid-western university. They found that students with learning disabilities took lighter course loads and graduated approximately one semester after the group of students without learning disabilities.

Usability and Accessibility

As described in *Chapter I*, usability is that quality of a website that makes it efficient, effective, and satisfying to any user (Henry, 2003). Henry describes five elements of website usability.

- Learnability – ability of individuals to use the website effectively the first time they visit it.
- Memorability – ability of individuals to remember how to use the website the next time they visit it.
- Effectiveness – ability of individuals to navigate through the website, understand and know how to interact with the content.

- Efficiency – ability of individuals to accomplish their goals in a timely manner.
- Satisfaction – tendency of individuals to feel good about their visit to the site and the likelihood they will return to the site in the future.

Accessibility is often used to refer to access by all individuals; however, advocates talk about accessibility specifically in terms of individuals with disabilities (Foley, 2007). It is this definition of accessibility that is relevant to this study. From this perspective, accessibility refers to the ability of an individual with a disability to access information via the computer. Accessibility of the web can therefore be defined as the ability of people with disabilities to "perceive, understand, navigate, and interact with the Web" (World Wide Web Consortium Web Accessibility Initiative, 2005, para. 1).

While many websites meet the technical requirements of accessibility, they fail to meet the characteristics of a usable website. For example, a website might have all images described with alternative text so that individuals with a visual impairment using screen readers can still access the content communicated by the image. If, however, the alternative text is not clear or is irrelevant, the text is still not usable (Henry, 2003).

Accessibility guidelines. In order to provide guidance to web designers, a number of accessibility standards and guidelines have been proposed. While these standards vary, their goal is common: to increase accessibility of the web for individuals with disabilities (Foley, 2003). There are two major guidelines that impact accessible web design. The first set of guidelines is the work of the Web Accessibility Initiative (WAI) established in 1997 by the World-Wide Web Consortium (W3C). The purpose of the WAI is to "promote and achieve Web functionality for people with disabilities"

(W3C, 1997, para. 1). The work of the WAI resulted in the publication of the Web Consortium Accessibility Guidelines (WCAG) 1.0 in May of 1999 (W3C WAI, 1999). In December of 2008, after a ten (10) year process to develop guidelines that meet the needs of a variety of stakeholder groups, the WCAG 2.0 guidelines were published (W3C WAI, 2008). Another set of guidelines, required by Section 508 of the Rehabilitation Act Amendments of 1998, was published by the U.S. Access Board in December 2000. These standards became effective in June of 2001 and share many of the same guidelines as the WCAG 1.0 (Architectural and Transportation Barriers Compliance Board, 2000). Both of these guidelines are structured in such a way as to be readily applied by web-designers; however, there is insufficient evidence that the application of these guidelines actually increases accessibility (Kelly et al., 2008).

Accessibility and learning disabilities. Learning disabilities are classified by the American With Disabilities Act (ADA) as a type of cognitive disability. Because cognitive disabilities in general are poorly understood and vary widely, web developers rarely consider the needs of individuals with cognitive disabilities when they develop web-based interfaces (WebAIM, n.d.). To make the situation even more difficult for the web developer, few guidelines exist that address the needs of individuals with cognitive disabilities. For example, the WCAG focus primarily on accommodating the needs of individuals with sensory disabilities (visual or auditory impairments) or physical disabilities (Bricout, 2001). Those guidelines that do address the needs of individuals with cognitive disabilities are poorly supported by empirical research (WebAIM, n.d.).

Seale (2006) indicates that there are several positive features of e-learning for students with disabilities. For example, because e-learning is flexible and adaptable, it

can suit a variety of learning styles. Adaptive technology interfacing with the computer screen makes reading accessible to the student with visual processing impairments and provides a text-based learning environment for the student with auditory processing impairments. For this reason, the online learning environment may have a positive impact on the performance of students with such impairments. The negative impact of e-learning, however, should not be overlooked. Seale indicates that when accessibility is not considered in the development of electronic courses, barriers can be raised to participation. The instructor must therefore give attention prior to delivery as to how the content on the computer screen will be perceived by the student. Attending to accessibility may best be carried out in a collaborative manner between student and instructor, but this collaboration is often more difficult in the online environment (Bricout, 2001).

College students with disabilities are expected to advocate for themselves in order to obtain the accommodations they need to achieve academic success (Field, Sarver, & Shaw, 2003). Bricout (2001) suggests that the online environment might actually make such advocacy more difficult resulting in fewer accommodations being made available. The online environment also makes it more difficult for the professor to identify the need for such an accommodation. Once a student requests accommodations, however, the ADA requires instructors to make reasonable attempts to meet the needs of the student. In the e-learning environment, this is most easily seen in terms of supplemental technology supports such as text-to-speech software for individuals with visual impairments. It should be noted that most assistive technology has been developed to meet the needs of individuals with sensory and/or motor impairments (Crow, 2008).

Although text-to-speech software is used by some individuals with reading impairments, little is known about how these students use such technology or about the impact on learning (Wolfe & Lee, 2007). Other accommodation strategies that do not involve additional technology include making navigation consistent from screen to screen so as to increase the speed and efficiency of locating and using content, increasing the size or color of text, and captioning verbally presented material (Seale, 2006).

Little has been written, however, regarding the accessibility of web-based learning materials as it applies specifically to students with learning disabilities. Parker and Banerjee (2007) completed a research study in which they surveyed college students with and without learning disabilities related to their comfort level, preferences, and "fluency" or the ease of their use of electronic media. They found significant differences between students with and without learning disabilities in terms of all three variables. In some areas (e.g., use of spreadsheets and presentation software) individuals with learning disabilities reported greater comfort and fluency than students without learning disabilities. In other areas, students with learning disabilities reported less comfort (e.g., multi-tasking, online searching). While accessibility was not directly addressed by this survey, the differences found in this study could certainly be related to the accessibility and usability of web-based materials for students in the sample.

Accessibility of the virtual campus. Many colleges and universities are using an ad hoc or "as needed" approach to accessibility. However, this approach results in barriers to access for both students and faculty that would be unnecessary if accessibility was considered during early states of design and development. Early consideration may also result in cost savings to the college as built in accessibility is easier and therefore

less time intensive than putting accommodations in place after a course or service has been developed (Burgstahler, 2000). In addition, the as-needed approach does not meet the requirements of Section 508 (Cardenas, 1997).

Fichten et al. (2009) administered an online questionnaire to 223 college students with various disabilities, 58 campus disability service providers, 28 professors, and 33 campus-based e-learning professionals. All participants either studied or were employed by one of 18 Canadian postsecondary institutions. Of the student participants, 41 percent indicated they had a learning disability. Results of the questionnaire indicated that 20 percent of students, 37 percent of service providers, 24 percent of professors and 36 percent of e-learning professors found that inaccessibility of websites and course management systems was a problem. This item was the number one problem identified by all groups.

Website accessibility studies of college homepages are numerous. Most of these studies were carried out prior to 2009 and therefore were completed using the WCAG 1.0 guidelines. These guidelines established three "priority levels" with several checkpoints at each level (W3C WAI, 1999). Most of the studies looking at website accessibility described a website as "accessible" if it met all checkpoints at Priority Level 1. A summary of these priority levels is included in Table 2 below. In general, the percentage of fully accessible college homepages is low. For example, Flowers, Bray, & Algozzine (2001) evaluated the home pages of 253 community colleges. Only 23percent of the homepages they evaluated met all Priority Level 1, WCAG 1.0 checkpoints. In a similar study, Schmetzke (2001) found that only 23 percent of the webpages of schools of library and information science met Priority Level 1 checkpoints. Besides WCAG 1.0

guidelines, compliance with Section 508 standards have also been used in studies of web accessibility. For example, Huprich and Green (2006) evaluated 21 library websites at public liberal arts colleges. They found only three (14 percent) had no accessibility errors.

Table 2

WCAG 1.0 Priority Levels

Priority 1	These checkpoints must be satisfied or one or more groups will find it impossible to access information. Example: alternative text must be provided for any visual images so that screen readers, used by individuals with visual impairments, can read the content of the image.
Priority 2	These checkpoints should be satisfied or one or more groups of individuals will find it difficult to access information. Example: ensure sufficient color contrast for an individual with low vision.
Priority 3	These checkpoints may be addressed as one or more groups will find it somewhat difficult to access information. Example: develop a consistent style of presentation across pages.

While these results suggest that accessibility is inadequate to meet the needs of college students with disabilities, what is even more discouraging is that even with an awareness of the issues of accessibility, change in web development practices may be difficult to implement. In a longitudinal study, Curl & Bowers (2009) found that accessibility as a whole had improved in five schools offering baccalaureate social work

programs between 2003 and 2008. However, even after the 2003 initial findings of inaccessibility and presumably some awareness of those findings, only 25 percent of the programs in 2008 met all Priority Level 1 checkpoints.

No studies found for this literature review studied the accessibility of campus web-based applications such as registration or purchase of textbooks. Seale (2006), advocating for the importance of such research, points to the legal requirements for colleges and universities to consider accessibility when putting services and information on the web.

Laws Related to Accessibility. Perhaps the best known of the legislative mandates for providing access to individuals with disability is the American with Disabilities Act which requires that programs and services provided to the public must be made accessible to individuals with disabilities. Also of concern to educators are Section 504 of the Rehabilitation Act of 1973 and Section 508 of the Rehabilitation Act of 1973, as amended in 1998. Each of these is described briefly below.

Americans With Disabilities Act (ADA). The ADA, signed into law in 1990, requires that individuals with disabilities be provided with equal access to public facilities and services. ADA (Title II) specifically recognizes the importance of communication and requires that public entities must ensure that communications with individuals who have a disability are as effective as communications with individuals who do not have a disability (American With Disabilities Act, 1990). Elevators, curb cuts, lifts in buses and other physical features are pointed to as signs of ADA compliance efforts with little attention given to the virtual environment (Burgstahler, 2000).

Colleges and universities fall under the jurisdiction of the ADA and are therefore required to provide equal access to the services and communications they provide to students (Burgstahler, 2000). In 1996, the U.S. Department of Justice clarified the application of ADA to Internet based education when it stated:

> Covered entities under the ADA are required to provide effective communication, regardless of whether they generally communicate through print media, audio media or computerized media such as the Internet. Covered entities that use the Internet for communications regarding their programs, goods, or services must be prepared to offer those communications through accessible means as well (W3C WAI, 1997, para. 5).

Section 504 of the Rehabilitation Act of 1973. The Rehabilitation Act of 1973 was the first statute to extend civil rights protections to individuals with disabilities. In terms of accessibility, Title V of this Act provides legislation protecting the civil rights for eligible persons with disabilities. Section 504 specifically prohibits excluding individuals from participation in any activity receiving federal funding assistance (e.g., federal financial aid) on the basis of their disability (Rehabilitation Act, 1973).

Section 508 of the Rehabilitation Act of 1973, as amended in 1998. Originally passed in 1986, Section 508 has been amended twice, once in 1992 and again in 1998. Section 508, as amended, establishes accessibility requirements for electronic and information technology that is developed, maintained, procured, or used by federal agencies and departments (Rehabilitation Act of 1973, as amended, 1998). These requirements ensure accessibility for employees and members of the public served by these agencies and departments. Although private colleges and universities, such **as**

EFU, are not directly affected by Section 508, these institutions compete in the marketplace with public institutions for the same students. To remain competitive with students with disabilities, private institutions may find it important to attend to accessibility guidelines (Yu, 2002).

Grounded Theory Methodology

The phenomenon of interest to this study is the experiences of students with learning disabilities as they interact with the virtual campus. In the discussion above, I have framed the phenomenon as one of accessibility and argued for the importance of ensuring accessibility of web-based information from a pedagogical, legal, business, and social justice perspective. The scarcity of literature related specifically to this phenomenon led me to the decision to use an inductive methodology for this study, specifically, grounded theory methodology (GMT). More detail on the implementation of GMT will be provided in *Chapter III.* A description of GMT itself, with examples from published studies, is included in this chapter.

I explored a number of inductive approaches when developing the proposal for this study. While other approaches had advantages in terms of developing a rich description of the phenomenon of interest, I wanted to go beyond a description to a tentative theoretical understanding on which to base future studies. GMT seemed most appropriate for achieving this purpose (Glaser and Strauss, 1967; Strauss & Corbin, 1990).

Bryant and Charmaz (2007b) state, “The Grounded Theory Method (GTM) comprises a systematic, inductive, and comparative approach for conducting inquiry for the purpose of constructing theory” (p.1). It is inductive in that theoretical constructs and

principles are “discovered” in the process of systematic collection and analysis of information. The discovered constructs are revised and modified through an iterative analysis process in which data from each participant informs the questions and observations of subsequent participants (Glaser, 1992). This ongoing analysis also compares and contrasts data obtained from the participants and the reflections of the researcher, as well as published literature in what is called the constant comparative analysis method. These constant comparisons lead to the uncovering of common concepts and principles from which tentative hypotheses are derived. These hypotheses then form the basis of a theoretical understanding of the phenomenon (Bryant and Charmaz, 2007b).

Glaser and Strauss (1965) developed GTM as a research methodology for their work with terminally ill individuals. They elaborated on the method in their 1967 publication, *The Discovery of Grounded Theory: Strategies for Qualitative Research.* Since its introduction, GTM has remained constant in its purpose of theory generation, but the methods and processes used in the implementation of such studies have evolved. Glaser has perhaps stayed the closest to its original conception in his writings and continued research. Strauss, on the other hand, veered away from initial procedures, advocating a more structured process to data analysis. He also suggested that GTM could be used to provisionally test the theoretical hypotheses derived from such a study (Strauss & Corbin, 1990). Glaser (1992) strongly disagreed with this stance, indicating that the structure of the processes advocated by Strauss and Corbin lead to “forcing the data” into preconceived structures.

The potential for researcher bias to influence data collection and analysis, as Glaser (1992) suggests, is one of the primary criticisms of GTM. As previously described, the GTM researcher is cautioned to approach research without a review of the literature that might result in preconceptions. This admonition is itself criticized by some authors writing in the GTM field (Kelle, 2007). Strauss and Corbin (1990) suggest that to not view existing literature is to reduce theoretical sensitivity to possibly relevant theoretical frameworks. Another criticism is that the absence of reading leads to poor integration of findings with existing literature (Bryant & Charmaz, 2007b).

In planning this study, I chose to approach the study phenomenon, the interaction of student and virtual campus, without an extensive literature review. As Strubing (2007) indicates, however, researchers using the GTM must have a perspective that helps them see relevant categories in the data. This perspective comes from the researchers' experience, background, and reading. I approached the phenomenon with some knowledge that could conceivably result in a bias, but which also most likely allowed me to respond with theoretical sensitivity to the findings. I addressed concerns related to forcing the data by carefully explicating, in a series of theoretical memos, how my prior knowledge might bias my analysis. I returned to these memos throughout the study, looking for such a bias.

Another criticism of GTM is common to many qualitative methods and is the weakness inherent to research approaches that collect large amounts of qualitative data without explicated procedures for the analysis of that data (Bryant & Charmaz, 2007b). In an overview of the history of GTM, Bryant and Charmaz (2007a) suggest that the systematic nature of GTM as it was developed in the 1960's was in answer to just such

criticisms. A review of a number of GTM studies (see for example Bigus, 1996; Pleschberger, 2007; Robinson, 1996) suggests that the variety of procedures used during analysis in such studies might lead to an appearance of a non-systematic process. In most instances, however, the data analysis procedures do indeed remain systematic and well described.

Bryant and Charmaz (2007a) describe yet another variation of GTM. They call this variation the constructivist version in which methodological strategies for data analysis, developed over the past 40 years of research in the GTM tradition, are "constructed" to take into account the specific context in which research is taking place. These authors suggest that GTM research can be characterized as falling into the Glaserian school, the Strauss and Corbin school, or the Constructivist school.

I used the constructivist approach to GTM in this study. In *Chapter V*, I describe the analysis process I used, constructed with the technology that was itself an interest of this study and borrowed from my background in instructional technology. Although, as discussed later in this report, I varied my analysis methods and procedures from those described in other GTM studies, the procedures I used in my analysis were chosen for their systematic, and perhaps even replicable, nature. While the constant comparison method of analysis was the foundational analysis process, the use of situational maps (Clarke, 2005), process flowcharts, and storyboarding were used to aid in those comparisons.

Research question. Given that this methodology is chosen when little is known about the phenomenon being studied, it is assumed that not all concepts have been identified, or if identified that their relationships are poorly understood. The initial

research question then is broadly stated or rather "a statement that identifies the phenomenon to be studied." (Strauss & Corbin, 1990, p. 38). Hood (2007) compared GTM to what she called generic qualitative methods. In this comparison, she noted that GTM uses primarily process oriented questions, focusing on the actions that are occurring related to the phenomenon of interest. These questions become more focused during the study as understanding is gained.

For example, in their classic work on dying, Glaser and Strauss (1965) entered the field of terminally ill patients with questions related to the phenomenon of what patients knew about their condition of dying. Only after becoming immersed in the hospital environment did they note how this awareness of dying impacted and altered actions occurring between the patient and staff. In a more recent, but related, GTM study on dying, Pleschberger (2007) entered the environment of nursing homes to study the phenomenon of patient dignity in end-of-life care. She came away with a grounded theory related to the high vulnerability of dignity when nursing home residents are dependent on the actions of staff for help and care.

Data collection methods. Data in a GTM study is typically obtained through a variety of qualitative methods. As is typical of qualitative research, this information is transcribed into field-notes that are then coded during analysis. Given the iterative nature of GTM, initial interviews are typically transcribed verbatim and observations carefully documented in their entirety. Depending on the concepts that emerge, continued transcription may become more selective. Such selectivity is used to elaborate on emerging concepts or to fill gaps in the theoretical understanding that is developing (Strauss & Corbin, 1990). Although agreeing that most of the data is collected through

qualitative methods, Glaser (1992) describes grounded theory as an analysis process that can be used just as well with quantitative data.

Reports of GTM studies provide a rich description of different data collection procedures. For example, Glaser and Strauss used observations of medical staff during medical conferences and day-to-day hospital routines in their 1965 study. Calkins (1993) also observed medical professionals but added observations of family members of dying patients in her study of the chronically ill. Interviews are a consistent feature of GTM. For example, Pleschberger (2007) interviewed administrators of nursing homes as well as nursing home residents in her study. Morrison and James (2009) interviewed Azorean men and women in their study on the interplay of immigration and acculturation with family dynamics. Informal interviews, often during observation, were also reported.

I began *Chapter II* by relaying Glaser's (1992) warning about developing preconceptions through an intensive literature review. Once data has been collected and initial analysis has occurred, the researcher identifies relevant literature that then becomes data itself for continuing analysis. Glaser (1992) suggests that such literature review should not occur until concepts have emerged from the initial analysis and "stabilized" or become less changeable with subsequent data collection. Lempert (2007), while acknowledging the concern about forcing the data to fit preconceptions, suggests that literature during the initial analysis can help to identify when ideas are truly new or just new to the researcher. Using the literature as data and comparing it to participant data identifies gaps and differences between what is known and what the data reveals.

In a similar manner, theoretical memos are also used as data. Glaser and Strauss (1967) introduced the idea of theoretical memoing in their initial work. Although a

number of variations of "how to memo" can be found in the literature, Lemphert (2007) describes all such variations as just different ways in which to interact with the data. The purpose of the theoretical memo is to explore, explain, and theorize about the data. It raises the level of the analysis from simple description to theory generation. According to Lemphert, initial memos are speculative, lacking in coherence with other memos. As analysis proceeds, memos are compared to the literature, to the participant data, and to each other.

Data analysis methods. Data, while describing reality, does not become theory until it has been interpreted and placed into a "conceptual scheme." This scheme is comprised of concepts, derived from or grounded in the data, and principles in which the relationships between concepts are explicated (Strauss and Corbin, 1990). The literature on GTM describes the constant comparative method of data analysis as the process that uncovers those concepts (Strauss & Corbin, 1990). This method of analysis is comprised of two general processes; (1) making comparisons so as to uncover differences and similarities in the data, and (2) asking questions about why those differences and similarities are there. To facilitate this comparison, a series of coding processes are used. Bryant and Charmaz (2007a) indicate that some confusion exists with the terminology related to coding, but in general, coding proceeds from specific instances in the data (open codes) to the grouping of codes into categories and from there, the identification of meaning and relationships translated into concepts or conceptual coding. The categories and conceptual codes may be represented in the literature, in which case, the process is informed by that literature.

A number of coding procedures are reported in the literature. Strauss and Corbin (1990) describe a procedure they call axial coding. These codes are driven by very specific, predetermined questions. These authors also describe the use of a conditional matrix or analytical framework that explicates emerging relationships. Glaser (1992) expressed concern about the use of axial coding, believing that specific questions too early in the analysis process forces the data into categories determined by the questions rather than determined by the data itself. Glaser (1992) talks about a series of theoretical codes used to elaborate on the causes, context, contingencies, consequences, co-variances, and conditions (the Six C's) of the emerging concepts. More recent GTM studies in the constructivist school, have used a number of visual devices to facilitate analysis including maps, tree and Venn diagrams, and matrices (Dey, 2007; Kelle, 2007). As Bryant and Charmaz (2007a) suggest, the specific technique or procedure adopted for analysis should proceed from the data and emerging theory, a process that is in keeping with the constructivist perspective of GTM.

This perspective is clearly epitomized by Clarke (2005) who advocates for a process she calls situational analysis. In situational analysis, three different types of maps are used: (1) situational maps are used to explicate human, non-human, and other elements in the situation under study; (2) social world or arena maps are used to identify the "arenas" or social structures within which commitment and discourse of those elements interact; and (3) positional maps are used to identify the differences, concerns and controversies about issues within the situation being studied and the positions of the actors toward those issues (Clarke, 2005). The use of these maps is not prescribed, rather they are seen as types of analytic exercises supplemental to the traditional GTM analysis.

Theoretical sensitivity. One of the concepts critical to the practice of GTM is "theoretical sensitivity" (Glaser, 1978). This term is used to identify the sensitivity of the researcher to the meaning found in the data. This sensitivity is influenced by the researcher's readings and experience and tends to develop over the course of a study in which emersion in the data increases sensitivity. Various authors suggest other methods for improving theoretical sensitivity.

For instance, Strauss and Corbin (1990) suggest that reading about a study's phenomenon can also increase sensitivity to

- the conditions that impact the phenomenon of interest;
- the strategies the participant may use to deal with the phenomenon;
- the consequences of the participants' actions;
- how change occurs over time;
- the variations in the phenomenon; and
- the types of tasks involved.

Glaser (1992) believes that the danger of forcing data as the result of prior reading is too high to accept Strauss and Corbin's suggestions and instead suggests developing theoretical sensitivity by reading other GTM studies to allow the researcher to observe how conceptual thinking develops from the data and provides examples for analysis. I chose to follow Glaser's advice and read a number of GTM studies to gain a sense, or sensitivity, as to how the researchers came to their conclusions. For instance, Bigus (1996) describes a process of developing questions from the initial data that then expanded into a series of topics, each with its own questions. Robinson (1996) formed an imaginary discussion group to which she presented her initial findings and found that

organizing the presentation helped her think through the data. Humberstone (2002) discusses a graphic means of connecting categories by listening for connections and then explicitly writing that connection or relationship onto a diagram.

Kelle (2007) calls Glaser's view rather outmoded or "naïve inductivism" and states his belief that no researcher enters the field without some preconceptions. The tension between allowing conceptions to emerge from the data and demonstrating theoretical sensitivity based on prior knowledge is one that Kelle believes should be consciously attended to by the researcher. I agree with Kelle that my interest, background, and experience did indeed create a tension that I found I needed to attend to throughout the study.

One of the results of this process of nurturing theoretical sensitivity was to build my confidence in attempting analysis procedures that had not been explicated elsewhere but yet were suggested by my background in instructional technology and the context of the web itself. The variety of analysis procedures reported in the literature allowed me to see possibilities but yet cautioned me that whatever process I chose, it was the systematic nature of that process that was important.

Conclusion

In this chapter, I reviewed literature in the field of disability studies and in the field of learning disabilities, showing how these two fields intersect in that the label of learning disability is a social construction that can be viewed through the perspective of the social model of disability. I discussed accessibility, describing accessibility guidelines and legislation and their relationship to learning disabilities and to the virtual campus of colleges and universities. I concluded by describing grounded theory methodology.

The phenomenon of interest to this study is the experiences of students with learning disabilities as they interact with the virtual campus. It is known that the number of students with learning disabilities that are enrolling in colleges and universities is increasing. It is also known that these students do not graduate from college at the same rate as students without learning disabilities. A number of studies suggest different variables both inherent to the individual student and related to external factors that may account for this difference in success.

It is known that colleges and universities are increasingly turning to the web to provide services to their students. These services are more attractive to technologically savvy students and are seen as cost saving by the institution. In addition, an increased web presence in terms of online course offerings has increased the marketability of the institution to non-traditional students. Online students need more than just online courses. These students need to be provided with online ancillary or business services as well. While usability is critical to the use of web-based services by all students, accessibility issues impact students with disabilities. The interaction between students with learning disabilities and the virtual campus requires consideration of web accessibility.

I chose an inductive approach, GTM, for this study as I wished to develop a theoretical understanding of accessibility issues as it impacts the experience of college students with learning disabilities on the virtual campus. In *Chapter III*, the specific methods used in this study will be described.

Chapter III

Methodology

Introduction

In *Chapters I and II*, I argued that because students with learning disabilities make up a significant percentage of students enrolling in colleges and universities, it is important that their needs be proactively addressed so that they can participate fully in the college experience (Cole & Cain, 1996). One of the trends currently impacting students is the move to web-based services provided by colleges and universities. The research question that guided this study relates to how college and university web-based services within the virtual campus are experienced by students with learning disabilities. This question is unanswered in the literature; it is simply not known if such services are accessible. I further argued in *Chapter I* that given this lack of knowledge, an inductive approach is appropriate in attempting to gain an understanding of accessibility of the virtual campus. One such inductive approach, Grounded Theory Methodology (GTM), was chosen for this study. In this chapter, I describe the specific methods used in this study.

The literature related to accessibility and usability informed this study in two important ways: (1) while there are a number of rationales put forward for ensuring accessibility, I find the desire to ensure social justice to be of most interest; and (2) I modified the methods of data collection commonly implemented in usability testing to obtain the type of data that could be used to generate theory. Both of these influences are further discussed below.

Social Justice. Students access the virtual campus in order to obtain information. With that information they can then carry out a variety of tasks such as registering for

classes, checking grades, purchasing textbooks, and following athletic team schedules. Inaccessibility of these web-based services deprives students of information and services that are an expected part of college life. Ensuring that information is accessible to all students is simply the "right" thing to do from a social justice perspective.

Seale (2006) states the experiences of individuals with accessibility of websites should not be assumed to be a common experience. Rather, individuals interacting with the virtual environment have their own unique experience of accessibility. Given that each student experiences accessibility differently, it is important that research address the experiences of college students with learning disabilities from the perspective of the individual student (Hadley, 2006). In their introduction to *Learning Impairments & Life Stories*, Rodis, Garrod, and Boscardin (2001) state that "...we have invested very little in the practice of entering into open, candid dialogue with persons who have learning impairments. We have not often and liberally asked them to articulate what they want, what they need, and what they think and feel" (p. xx). These authors go on to suggest that the result of this lack of investment is an "...understanding of the lives of persons with learning impairments...primarily stated in *our* words and *our* terms (authors' emphasis), not theirs. Consequently, we may have a much poorer understanding of their lives than we think" (p.xxi). From a social justice standpoint, I feel that giving voice to individual students with learning disabilities is an appropriate data collection method to explore accessibility of the virtual campus.

Usability Testing. A user-centered approach to design is often advocated in the literature on usability testing (Rubin, 1994). User-centered design involves individuals, chosen as representatives of eventual users, in each step of the design process. This

involvement typically takes the form of interview and observation while the user is engaged in completing tasks deemed essential to the purpose of the software/hardware.

The applicability of this type of testing to accessibility research can readily be seen given the individual nature of accessibility as discussed above. For instance, Theofanos and Redish (2003) used a usability-testing protocol to study how individuals with visual impairments accessed and used the Internet. In their study, informants were involved in four different sessions, each session requiring the participant to engage in 7-11 different scenarios or tasks. While engaged in the tasks, informants talked about what they were experiencing. This type of "think-aloud" protocol is common in usability testing (Rubin, 1994). While the interaction of student and web is observable, the cognitive process guiding that interaction is not observable and must be explicated by the informants themselves through their own words. Given the converging needs of allowing the student voice from a social justice standpoint as well as from a usability-testing standpoint, I chose a think aloud protocol to collect information in this study.

Grounded Theory Design

In order to understand the description that follows on data analysis and study design, terminology specific to the analysis process used in a GTM study must be defined. Glaser (1992) as well as Strauss and Corbin (1990) use specific language to designate the coding process used during GTM. It is worth noting at this point that the literature on GTM is somewhat confusing regarding the use of the terms *open codes, categories* and *concepts.* Bryant and Charmaz (2007a) advocate a hierarchy in which codes are combined into categories that in turn are combined into concepts. It is this hierarchy that will be used in this report. Definitions of these terms are included below:

- *Open coding*: The researcher starts with the raw data and assigns a code or term that communicates the idea the data suggests to the researcher. The term itself may come from the language of the incident being observed or from the researcher's mind as an image or analytic cue. These terms are called substantive or *open codes*.
- *Indicator*: The *indicator* is the actual data to which the open code is assigned. Indicators are used in the final theoretical writing as examples.
- *Categories*: Open codes are compared for similarities and differences using the constant comparison process. A category is a collection of open codes that share some characteristic.
- *Conceptual coding*: Categories are compared and combined to form concepts. Often these concepts are combined into overarching core concepts.
- *Theoretical memos*: The researcher writes ideas when they occur as the result of reading/working with the data. These ideas are written so that they aren't lost during the coding process and may be simply a phrase or sentence. These memos are treated as data during analysis.
- *Selective coding*: As categories and concepts begin to emerge during analysis, data is selectively coded with those categories and concepts in mind.

Glaser (1992) describes a four-stage process for GTM (see *Chapter I*). My original intent was to carry out the study with a similar number of informants in stages two and three. Only three informants volunteered for the third stage, so I continued to

open code the data from these three informants. In stage three, instead of selectively coding only these three new informants, I returned to the storyboards of all informants, removed the open codes, and recoded in a selective manner using the conceptual codes identified in stage two. Stage four was then carried out as initially planned. Table 1 from *Chapter I* has been modified in Table 3 below to reflect the modifications I made to Glaser's four-stage process in this study.

Stage one. Data was collected from three informants. Open codes were assigned to a transcription of their interview/observation sessions on a line-by-line basis. Data between informants and between tasks was compared. Theoretical memos were used during this process, commonly taking the form of questions that guided further analysis.

Stage two. GTM allows for a responsive nature to data collection and data analysis (Glaser,1992). Based on data collected during stage one, two changes were made to the data collection methods: (1) one task was deleted and a different one added to the think-aloud observation sessions; and (2) specific questions were added at several points during task performance. An additional 13 informants were observed during this stage. *Open codes* identified in stage one were used, as well as *open codes* and *categories* identified in the new data. *Categories* were combined into tentative *concepts.*

A number of analytic methods were used to aid in this analysis. Situational maps (Clarke, 2005) were initiated in stage two to help in identifying categories and concepts. Flowcharts, also initiated in stage two, were used to diagram informant performance identifying variations in successful and not successful task performance. Emerging concepts led to exploration of the literature, which was then incorporated into the theoretical memos written in stages 2,3, and 4.

Table 3

Modified Four Stage Grounded Theory Design

Stage One	Stage Two	Stage Three	Stage Four
Collected data on three informants Transcribed initial interviews and think-aloud sessions Generation of open codes on line by line basis Used constant comparative analysis to look for commonalities and differences in data Wrote theoretical memos related to ideas/thoughts - often took the form of questions to guide further data collection Revised data collection procedures to address emerging categories	Collected data on 13 informants Transcribed initial interviews and think-aloud sessions Open coded - used initial as well as emergent codes Combined codes into categories Used additional analysis processes including situational mapping and flowcharting of informant performance Identified properties of categories Continued theoretical memos Returned to the literature to inform thinking about emergent categories Posited initial conceptual codes	Recoded transcripts of 16 informants using selective coding process – based on emergent categories and conceptual codes Continued theoretical memos Continued literature review Evaluated emergent theory by comparing to data and to literature – looked for inconsistencies between data and theory	Reworked categories and concepts until all data were accounted for Continued theoretical memos – sorting and integrating them into developing theory and this report Continued to use literature to elaborate on categories and concepts as relevant Continued to evaluate emerging theory

Stage three. Transcripts of all informants were cleansed of all open codes and then recoded using a selective coding process, looking for additional indicators in order to "solidify" (LaGow, 1976) or "densify" (Glaser, 1992) the concepts. Literature became more important during this stage as it was used to evaluate the emerging categories and concepts in terms of similarities and differences with what is already known.

Stage four. I continued to review the data until I felt that no further *categories* or *concepts* were indicated. Exploration of the literature also continued on the resulting concepts. This report began to take shape as I combined theoretical memos.

Informants

Inclusion criteria for this study were that informants: (1) be enrolled at EFU during the time of the study, and (2) be registered with the EFU Disability Services Office (DOS) with a documented learning disability. Because of the issues related to obtaining consent for minors, informants were required to be over the age of 18 years at the time of their participation.

EFU enrolls between 600-750 new students each fall. Approximately 5 percent of these students identify themselves as learning disabled to the college's Student Disability Office when admitted (K. H., EFU Disability Services Director, personal communication, October, 2009). Students with learning disabilities are directed to register with the EFU Disability Services Office through a number of communications (e.g., admissions materials, enrollment materials, website). During the academic year in which this study was completed, 121 students were registered with this office; 76 of these students were identified as having a learning disability. Following IRB approval from both Syracuse University and EFU, a recruitment email (see Appendix A) was sent by the Disability

Officer to all 76 students using a blind copy process so that anonymity was maintained. Using a sampling frame involving an already established relationship was seen as a way to optimize recruitment as well as increase the students' trust in me, a consideration when engaged in qualitative studies (Yin, 2003). The email to potential informants included a direct link to my email. Once contacted, I made arrangements for the initial interview at which time informed consent was also obtained. See Appendix B for a copy of the consent form.

Three students responded to the email in the fall of 2009 and were interviewed and observed in stage one of this study. Ten students responded to a second email sent in March of 2010. An additional three students responded to yet a third email sent in April, 2010. These 16 students comprised the sample for this study. *Chapter IV* provides further information on these informants.

Although the number of informants in this study may be considered relatively small by researchers trained in quantitative analysis, Travers (2001) indicated that much can be learned from even a few informants if open-ended questions are used. In addition, Rubin (1994), while suggesting usability testing with a minimum of 10 users be considered best practice, also indicated that usability studies will find 80 percent of problems with as few as 4-6 informants.

While random selection was considered, due to the nature of GTM, convenience sampling was considered more appropriate. Purposive sampling was considered to obtain students who demonstrated significant insight and verbal abilities, however, this type of selection process seemed to me to be contrary to the inclusive nature of this inquiry. I tried to be particularly sensitive to issues related to discomfort with the data collection

procedures, using active listening skills to draw out informants during the initial interview, so that informants developed some measure of trust and comfort prior to the think-aloud observational session.

Data Collection

Initial interviews. Informants were engaged first in a one-on-one interview and then in a think-aloud online session. The initial interview focused on developing an understanding of the informants' learning disabilities. These interviews occurred in my private office and were audio-recorded and later transcribed. Initial interview questions, see Table 4 below, were based in part on the study carried out by Heiman and Kariv (2004). In that study, the authors used open-ended questions to obtain information about the types of difficulties experienced by college students with learning disabilities. The interview itself was semi-structured to allow for exploration of topics as they emerged. The data collected during these interviews is reported in *Chapter IV*. A sample transcription can be found in Appendix C.

Think-aloud sessions. A think-aloud session occurred one to seven days after the initial interview of each informant. A private room equipped with a computer was used for these sessions. The protocol for these sessions was based on the protocol used by Theofanos and Redish (2003) in their accessibility study. This protocol involved three phases.

***Phase one*.** I began the think-aloud session by carrying out a short, semi-structured interview (see Table 5 below).

***Phase two*.** Informants were asked to access the EFU homepage. From this start, they then carried out eight additional tasks. During the tasks the informants talked about

what they were thinking and doing. In stage one of this study, I recorded the time the informants used for each task intending to use time as a measure of efficient performance. I found that informants became so involved in the online tasks that they stopped talking. I needed to stop and ask questions that interfered with the time the informants used on each task. In the final analysis, I chose not to use performance times.

Table 4

Initial Interview Questions

- Tell me your first name. (This was used to identify the audio recording. Pseudonyms were used on the transcriptions to ensure confidentiality.)
- How old are you? (To ensure inclusion criteria conformance.)
- What class are you in college? Are you a freshmen, sophomore?
- What is your major?
- You have been invited to participate in this study because you have a documented learning disability. When did you first know you had a learning disability?
- Tell me about your learning disability?
- Do you receive any accommodations for your disability?
- What strategies do you use to be successful in your on-campus, face-to-face classes?
- Have you ever taken an online class? How did that go?

Another decision I made in stage one became critical during the analysis process. These first informants expressed subjective feelings about themselves that were at times quite negative. I didn't want to add to those feelings, so I determined that I would carry

out this study in a “value-added” manner. I wanted the informants to leave the think-aloud sessions knowing how to perform a task that they entered the session not knowing. At the same time, however, I felt that my observations of the informants’ actions as they struggled to perform unfamiliar tasks would uncover the types of accessibility issues I was looking for in the virtual campus.

I therefore determined that I would intervene and help with task performance when the informant became frustrated, angry and was, in my opinion, on the verge of “giving up.” This decision is consistent with the work of Vygotsky and his conception of the zone of proximal development (Zaretskii 2009). This conception acknowledges that learning occurs as a collaboration between child and adult when the problem situation is such that the child cannot solve the assigned problem independently. I acknowledge that the subjective nature of my decision to intervene may have added a bias to the study results. I feel that the approach I used, however, has merit in terms of being respectful toward the informants. I discuss this further in *Chapter V*.

Table 5

Questions Preceding Think-Aloud Session

- Do you have any questions for me based on our initial discussion?
- Tell me about your experience with the online environment in general. For example, how much time do you spend online during a typical day? What do you typically do online?
- Tell me about your experiences with the online services at EFU. How often do you go to the college website? What do you do when you go to the webpage?

When selecting tasks for this study, a literature search was carried out to determine what tasks college students commonly performed when interacting with the virtual campus. No studies were found that answered this question. I therefore carried out a purposive sampling of possible tasks based on my experiences with college students. I made two specific choices during initial task selection: (1) I avoided any task that would involve students accessing information in which their personal information would be recorded (e.g., financial accounts, grades); and (2) I focused on tasks relevant to students currently enrolled, avoiding tasks common to students seeking admission or to graduates.

During stage one of this study, one of the tasks included participating in a library tutorial. My intention was to look at a task that was pedagogical in purpose. The informants' performance of this task was found to result in limited information and was deleted during stage two. However, one of the informants in stage one indicated he had difficulty finding the email address of one of his instructors. This task was therefore added to the list of tasks during stage two. The list of tasks is included below in Table 6.

Phase three. Following the think-aloud session, I carried out a short debriefing with the informants, asking them if they have any further thoughts about the usability of the college's website and web-based applications (see Table 7).

Table 6

Tasks for the Think Aloud Session

- Describing the EFU homepage;
- Locating and then describing the homepage of the informants' academic (major) department homepage;
- Accessing the online course schedule and locating information related to a course in preparation for semester registration;
- Locating the text required for a course through the online bookstore;
- Identifying a book, on a topic chosen by the informant, from the online library catalog;
- Identifying a journal article, on a topic chosen by the informant, from the online library database service;
- Locating the date and time of an athletic game;
- Finding the time of the informants' last final exam for the semester;
- Viewing an online research tutorial based on the library homepage (stage one); or locating the email address of an instructor (stage two).

Table 7

Questions Following Think-Aloud Session

- Was today a typical day for you in terms of your online experience? In what ways? If not, why not?
- Is there any use of the online campus that we haven't tried that you find to be a problem for you? (If yes, the participant was asked to demonstrate the problem.)
- Is there anything else you would like to tell me?

Informants in stage one were audio taped and their actions online recorded using Morae software loaded on a laptop computer with attached mouse. It was determined following stage one that video recordings might be helpful to record non-verbal actions. Data collection in stage two was therefore carried out using the Adobe-Connect web-based service, a video camera, and a desktop computer. The size of the screen and other hardware features were similar between stages. All sessions were held in the same private room.

When judging the quality of qualitative data collection methods, issues of trustworthiness and credibility should be considered (DePoy and Gitlin, 2005).

Credibility. The transcription of one of the informants in stage one, chosen randomly, was distributed to two other individuals with experience in qualitative data analysis. Coding was discussed, and points of disagreement were resolved. The addition of several codes resulted from this joint coding experience. In addition, using the constant comparative method of analysis, the video recordings, observations, and

interview information were used in a process of triangulation in order to verify the accuracy of the information obtained.

Trustworthiness. Throughout the interview and think-aloud sessions, the informants were asked to clarify and expand on responses to improve my understanding of their responses and experiences. Following stage one data analysis, a short summary of the informants' performance and my analysis was emailed to the three informants. They were asked to comment on the summary. No informants responded to this email, and the procedure was not used in stage two.

Data Management

To organize the data for analysis, the audio recordings of the initial interviews and think-aloud sessions were transcribed. Video recordings of the think-aloud sessions were reviewed multiple times, and a narrative developed that described the informants' non-verbal actions and their online actions. In order to better link the informants' performance and interview responses, a storyboard record was developed that included a description of the screen itself for each task, the online actions, the transcribed audio recordings, and a description of the informants' non-verbal actions. Coding was carried out on all of an informant's data at the same time, allowing relationships to be noted between these separate pieces of data. The format of a storyboard is provided here as *Figure 2* but the reader is also directed to Appendix D for a more complete example. A graphical representation in the form of a flow chart was also developed for task performance. The flow chart of one informant was superimposed upon the performance of other informants so that similarities and differences were more easily seen. *Figure 3* is an example of a flow chart but the reader is also directed to Appendix E.

Mouse movements	Screen description	Transcription of informant's comments	Researcher's observations	Codes
On homepage already, mouse quiet	Homepage – lots of pictures, UC Banner fills ¼ of page, announcements, color, different size font	...*looking first at the college homepage, what pops into your head when you look at it?* I sometimes go to that too to check out what's going on around campus. And um, I just read what they say here. Like homecoming weekend, ...I really don't think of anything. I just look at it and like, "ok".	Initially quiet (while reading)	• Know what's going on • Read screen • What it looks like • Habit • Information gathering • Mouse quiet • scanning

Figure 2. Example of a Storyboard.

Limitations

As with all research, limitations to this study are present. Some may see the primary limitations as inherent to the GTM itself in its reliance on qualitative data collection methods to generate rather than verify theory. Those who believe that the scientific method, characterized by hypothesis testing, is the only valid manner of building knowledge will meet this characteristic of GTM with skepticism. GTM is intended to be the first step in a research agenda that includes further verification of the hypotheses generated as the result of this study. The intent of GTM is to base those hypotheses on data.

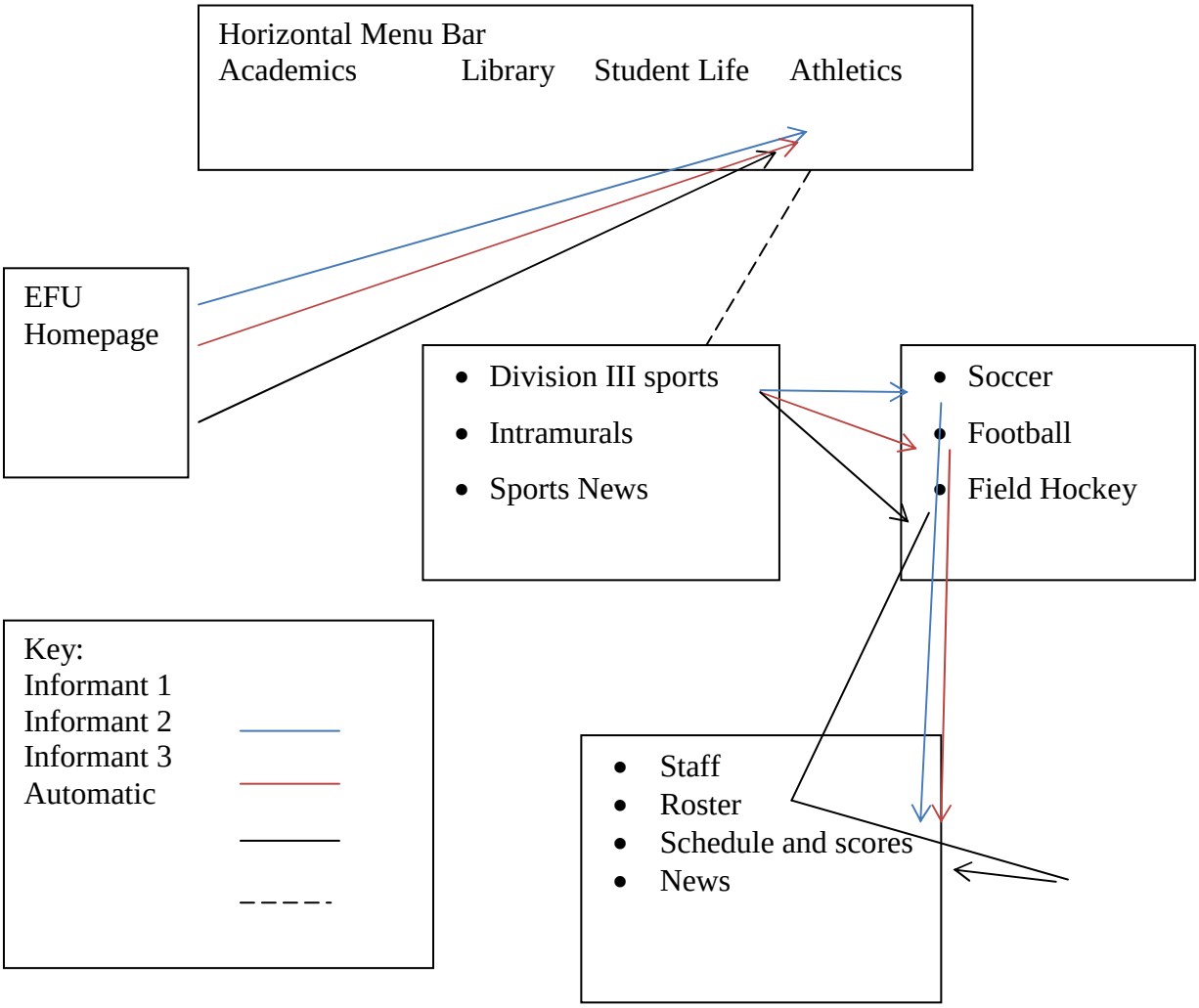


Figure 3. Example of a Flowchart.

I acknowledge that qualitative data analysis is subjective and therefore susceptible to bias. However, that subjectivity can be a positive aspect in that it brings to the analysis the theoretical sensitivity that Glaser (1992) indicates is a strength of GTM. In beginning this study, I chose to memo about the assumptions I was making based on years of experience as both a teacher of college students with learning disabilities and as a therapist of children with learning disabilities. By making these assumptions explicit, I was able to pay particular attention to them during data collection and analysis, ensuring

that bias was not entering into my thinking as much as possible. I reviewed this memo periodically throughout study implementation.

I see the primary limitations to this study to be related to the data collection methods. The think-aloud protocol was difficult for these informants. The richness of their descriptions was varied. Coupled with the small sample size, this limitation has resulted in a less "dense" theory than would be desirable. In addition, while I planned to have informants review a summary of their performance as a check on both my biases and to obtain further information, because informants were not responsive in stage one, I did not attempt to carry out this review in stage two. In future studies using this type of think-aloud protocol, a second session to review the recording is an option that should be considered.

Conclusion

This study followed the GTM in order to develop an understanding of the phenomenon of interest, the experience of students with learning disabilities with the virtual campus. Sixteen college students with learning disabilities were recruited and took part in this study during the 2009-2010 academic year. These informants were involved in an initial interview session in which they discussed their learning disabilities. They were then engaged in eight online tasks, while at the same time thinking-aloud about what they were experiencing. These sessions were audio recorded, video recorded, and the informants' computer actions also recorded. All data was transcribed and coded. Analysis was carried out following a modified version of the four-stage process typical of GTM studies.

The results of this analysis are reported in the following chapters. *Chapter IV* provides a description of the informants based on the initial interview results. *Chapter V* provides a description of the tasks and introduces a framework for the discussion that follows in *Chapters VI and VII.* In *Chapter VIII,* I provide a summary and discussion of the results, concluding with suggestions for further research based on the concepts and relationships uncovered during this study.

Chapter IV

Informants

Introduction

The over-arching research question that guided this study is: how do college students with learning disabilities experience services provided by a virtual campus? In this chapter, I will introduce the informants of this study and describe, in their own words, their learning disabilities. The focus will be on the informants, college students who have been labeled learning disabled and who experience differences in the way in which they learn. As Rodis, Garrod, and Boscardin (2001) state in their introduction to a series of thirteen autobiographical essays written by individuals with learning impairments, "..it is our hope to contribute positively to the lives and reputations of persons with learning impairments" (p. xi). My hope is that this study will also contribute positively to the lives of college students who have a learning disability. By gathering information through observation and interview, I have chosen to focus this study on the students' perspectives.

Demographic Characteristics of Informants

Sixteen students with documented learning disabilities comprised the sample for this study. A majority of the informants were female. All informants fell between the ages of 18 and 22 years. Table 8 details the data on gender and age of the informants. Approximately one-third of the informants were freshmen; only one informant was a senior. Informants represented a variety of different majors. Table 9 indicates the academic major and Table 10 indicates the year in college of the informants.

Table 8

Gender and Age of Informants (n = 16)

Gender	N	%
Females	12	75%
Males	4	25%
Age (in years)	**N**	**%**
18	6	37.5%
19	3	18.75%
20	2	12.5%
21	3	18.75%
22	2	12.5%

Informants' Learning Disabilities in Their Own Words

As discussed in *Chapter II*, learning disability is a broad term used to label individuals who demonstrate difficulty learning in what is considered the "typical" manner. The exact way in which these individuals learn, or don't learn, often is further specified according to some classification or diagnostic system. For example, individuals classified as dyslexic are individuals who have difficulties learning because of differences in the way they read. Individuals classified as dysgraphic are individuals who have differences in the way they write. These classifications are used to determine the accommodations or services to be provided by educational institutions to these students.

Table 9

Academic Major of Informants (n = 16)

Academic major	N	%
Psychology	4	25.0%
Criminal justice	3	18.75%
Physical/occupational therapy	2	12.5%
Communications	1	6.25%
Elementary education	1	6.25%
Government and politics	1	6.25%
Journalism and public relations	1	6.25%
Psychology/Child Life	1	6.25%
Public relations	1	6.25%
Therapeutic recreation	1	6.25%

Table 10

Year in College of Informants (n = 16)

Year in College	N	%
Freshmen	6	37.5%
Sophomore	5	31.25%
Junior	4	25.0%
Senior	1	6.25%

While informants in this study had documentation on file with the DOS related to the classification of their learning disabilities, I made no attempt to review these documents. Given the disability studies foundation for this study, I felt it was important to understand the informants' experiences with their learning disability through their own words. It was felt that the lived experiences of these students, how they experience learning, would be more useful in identifying issues related to web accessibility or inaccessibility than the classifications used in learning disability documentation.

During the initial interview, informants were asked to respond to the question, "Tell me about your learning disability." Many informants immediately responded by labeling themselves with their diagnostic classification (e.g., dyslexia, audio-discrepancy, attention deficit disorder). These informants were then asked to describe how their learning disability impacted their learning, and it was this description that was used in the analysis. Throughout the remainder of this chapter, the term "learning differences" will be used to distinguish the informants' description of their learning from their diagnostic learning disability label.

Using the constant comparative process, informants' self-descriptions were analyzed for similarities and differences. This comparison resulted in a loose grouping of informants who experienced learning in similar ways, allowing me to compare performance of informants with similar and different learning differences. I acknowledge that this grouping system retains a deficit orientation that is not in keeping with the foundation of this study, the social model of disability. I also found this grouping of informants uncomfortably close to a classification system, most likely influenced by the informants' as well as my own life experiences within existing classification systems (see

discussion below). It seemed important to me, however, to determine if the informants' learning differences influenced task performance within the virtual campus. If this were true, then it seemed likely to me that informants with similar differences might perform in a similar manner. I felt that this analysis was important enough to warrant such groupings.

As a means of aiding the analysis, this grouping system was used when assigning pseudonyms to the informants. The initials of the pseudonyms assigned to the informants are indicative of the type of learning differences the informants reported experiencing while learning. The informants' pseudonyms therefore became a type of mnemonic device to aid me during the analysis. It should be noted that several of the informants indicated difficulty in learning across a number of content and process areas (e.g., spelling and math, reading and listening). In these cases, the primary difference described by the informants was used as the initial of the first name and the initial of a middle name was used if there seemed to be a predominant secondary learning difference. For example, Andy Mark reported experiencing difficulty with attention (A) and memory (M). The initials used in assigning pseudonyms are listed in Table 11 below.

The convenience method of sampling used in this study resulted in a sample of informants that reported a range of learning differences. I make no claim, however, that these informants represent all the possible variations in learning differences. The most common learning difference reported by these informants was with reading. This is consistent with the literature on college students with learning disabilities (Gjajria et al. (2007).

Table 11

Initials Used When Assigning Pseudonyms to Informants

Initial	Self-Description of Learning Difference
A	Informants described difficulty with being able to attend to learning activities. Often these informants also indicated they were distractible and had difficulty focusing on what they were doing.
L	Only one informant was placed in this grouping. This informant described her difficulty with remembering and understanding terms that were unfamiliar (e.g., science terminology). This difficulty was described as involving both verbal and written language.
M	These informants described difficulty with memory. Difficulty with memory for these informants did not appear to be related to any one type of information (e.g., verbal or written, math or literature).
R	Informants indicated they had difficulty with reading. The specific difficulty with reading varied. Some individuals described having difficulty with transposing letters whereas others described having difficulty comprehending what they read.
S	The informants in this grouping did not describe themselves as having a difficulty with reading or listening, but simply with the speed they performed tasks involving those processes.
T	These informants described difficulty with arithmetic calculation and application of math concepts.
V	This designation was assigned to informants who reported a number of varied problems without one seeming to be predominant.
Y	Informants in this grouping indicated they had difficulty with understanding information provided aurally.
X	Informants in this grouping described themselves as being anxious, particularly in testing situations. Such anxiety interfered with their ability to understand test questions and/or remember information during a test.

Roddis, Garrod, and Boscardin (2001) invite their readers to understand the "unique intellectual styles or *modi-operandi"* (p. 168) of their students. It is this same understanding that is invited in this study. I want to introduce the informants of this study to the reader. I have included a brief description of each informant below. These descriptions have been organized by the groupings identified by my analysis of their self-descriptions.

Difficulty attending. Adam, a 20 year old sophomore majoring in government and politics, reported he finds himself having difficulty attending and is very easily distracted. He also reported that he works very hard although he also admitted that he tends to procrastinate and mentioned the term "avoidance" several times to describe his approach to school work. Adam is the only student in this study who indicated he was currently taking medications for his learning differences. He stated that he feels "different" when he is taking the medication and while not sure the medicine helps him attend any better, he does find he performs better when he takes it. He self-adjusts his medication based on his perceived need. He gave the example, "If I've got an essay due the next day and I still have to write four or five pages, that's when I'll take it."

Alicia Yolanda is a 19 year old psychology freshman who reported, "(I) struggled along in school and had all of those tests done that they put all of us little kids through." She focused her self-description on her attention problems, but also reported, she feels she might have "grown out of it (learning difference), or adapted to it, learned how to deal with it a little bit better since (high school)." She also admitted, however, that she still notices she has difficulty attending in certain situations, including outside the classroom. When specifically asked about her educational accommodations, she

indicated she was receiving note-taker services which was “nice to have” because the notes were more organized and complete than when she took them. She also admitted to being slow when taking her own notes.

Amanda Marie Ruth**,** an 18 year old freshmen majoring in communications, also reported attention problems. She indicated, however, that when she is really interested and motivated to learn, she doesn’t perceive herself as having attention problems although she remains distractible. The idea of motivation impacting her learning differences was heard also when discussing her memory difficulties. Amanda Marie Ruth talked about difficulty with memory, indicating, “I only memorize what interests me.” She described a dislike of reading, indicating that she has never read a book cover to cover until just lately (the Twilight series of novels). She skims all textbooks. Echoing a theme heard from other informants, Amanda Marie Ruth stated, “I really need to put forth a lot more effort (than other students).”

Andy Mark is an 18 year old male between majors. At the time of this study, he was a sophomore in the criminal justice major but was planning to switch to accounting. When I asked him to describe his learning differences, Andy Mark replied, “I sometimes don't think I have a learning disability.” I asked him to explain this statement, and he said, ”I usually don’t really notice my disability until after I should have done something about it, like *after* (informant’s emphasis) taking a test.” He talked about difficulty with focusing his attention, stating, “I have a hard time focusing in class. My mind wanders very easily.” He also indicated he has difficulty remembering information. He stated, “There’s information in class that I think I get and five minutes later I’ve forgot it, or I have no idea what they’re talking about.” He described his mind as “usually, it's a little

off." He described himself as a "decent (student), not horrible but not a genius. About average."

Difficulty with language. Lauren was the only senior in the sample. She is a 22 year old majoring in psychology, child-life. Lauren described her difficulty as primarily a problem with recalling unfamiliar words and terminology (e.g., scientific terms). While this is a type of memory problem, the "L" initial was used as she indicated her memory problems were specific to unfamiliar language. She reported that the learning difference surfaces primarily during test taking when she has difficulty determining what a question is asking when it includes terminology. She also described difficulty recalling answers that include such terms. She reported that she has no difficulty demonstrating her capabilities when allowed to demonstrate her learning through projects.

Difficulty with reading. It should be noted here that differences in reading ability can be due to a number of underlying impairments. The informants' self-descriptions were not specific enough for me to be able to match their self-descriptions with any formal classification system, nor did I feel it appropriate to try to do so given the foundation of this study.

Raeann Yamina is a 20 year old freshman hoping to enter a graduate program in physical or occupational therapy when she completes her undergraduate studies. She reported working very hard to deal with her learning differences, which she described as impacting reading, writing, and spelling. For example, she indicated that she has to "decode the words" she reads. When asked to describe this decoding process, she stated, "I break them (the letters of a word) up into groups and try to sound them out." She

described looking at a page of words and losing her place. Raeann Yamina also reported problems with being able to listen and recall auditory information.

Rebecca Talia is an 18 year old sophomore who began her college career as a nursing major but found the sciences "too difficult." She is currently majoring in psychology. She reported that she has difficulty in the areas of reading comprehension and math. Like several of the other informants, she indicated that she works extremely hard. She noted that she has to re-read passages in order to understand them. While she has struggled with grades, failing her first science course, she is generally proud of her grades, perhaps more so because others "thought I was going to do so bad[sic]. People have stereotypes of learning disabilities, like they're going to flunk out."

Rianna, a 21 year old junior majoring in psychology, is attending her first semester at EFU having transferred from a local community college. Rianna reported that words get "jumbled up" which increases the time she spends on reading and writing. She also sees and writes letters/numbers backwards. She reported that her spelling is so "horrible" that sometimes even the "computer (spell-checker) gets confused." She has much more difficulty reading when she is tired because letters start to "flip." Rianna also admitted to having trouble concentrating when trying to read information that is unfamiliar or uninteresting.

Slow processing of information. Sam is a 19 year old freshman majoring in criminal justice. Sam was fairly reticent during the initial interview, unable or unwilling to be specific as to his learning differences, other than to say he takes extra time and a separate location for testing. He also reported that he uses a note-taker because he gets behind if he tries to take notes himself. Because he takes his tests in a separate location,

he was asked if he is distractible. He indicated that the separate location helps him because the distraction of seeing people get up when they're done with a test causes him to rush, which he feels results in poorer performance. He denied having to take extra time to do his homework assignments.

Sarah is a 22 year old in the journalism and public relations major, minoring in film. She is a junior, having transferred to EFU this year from a local community college. In describing her learning differences, she reported, "I don't understand things at a quick enough speed as other people my age, or other people who've had the same education as I have." She reported that she asks a lot of questions, not just in the classroom but also on the job and even in casual conversations. She gave the example of asking for driving directions and then needing time to visualize the route that was being described. She also finds that because she takes so long processing information, she becomes distracted easily. In talking about the social cost of having a learning disability, Sarah indicated that asking questions sometimes makes her feel "bad."

Difficulty with math. Tammy is a 19 year old female, majoring in criminal justice and hoping to work in the area of human rights after graduation. When asked to describe her learning differences, Tammy stated, "It's just math. It's really weird. Because like, when it comes to English, science, or whatever material, I know the material, I'm comfortable with the material. But math, I'm not comfortable." Tammy indicated that she has to go very slowly when dealing with math because she goes "through little different steps to figure out what is right," and does math problems repeatedly until she knows "deep down" that she can do them. Tammy was the only informant who talked about how frustrating it was to deal with professors. She finds that

often they simply don't understand her disability. She finds that some instructors become so frustrated trying to help her that they simply give up and tell her the answer.

Tara Xu, a 21 year old psychology junior described herself as being anxious and distractible during test taking in math courses. She reported, "When it comes to taking (math) tests, I can't think." According to her, numbers "just don't work with me." She reported that she is "really good" with writing and doesn't use her accommodations for anything other than math courses.

Difficulties with varied learning differences. This grouping was made for those students I found difficult to group because of the multitude of differences they reported experiencing without one seeming to be predominant.

Vana is an 18 year old sophomore majoring in therapeutic recreation. When asked to describe her disability, Vana indicated that she didn't "know exactly what it is" but that her ability to comprehend what she reads is "very low." However, her description of the challenges she faces goes beyond reading comprehension into many different areas. While math is "easy" for her, math courses such as statistics are challenging because she has to read about situations and then apply the math. She also indicated that remembering information she reads, and sometimes hears, is difficult for her and that her writing is "horrible." Vana feels she doesn't know how to study and that her "test scores show it." Besides her difficulty with reading, she also reported test anxiety and not liking to "sit in one spot, for a long period of time, not being able to get up."

Vanita is also in her first semester at EFU. She is a 21 year old junior in the communications major and is intending to get her elementary education certification.

She hopes eventually to teach special education so that she can “push children to do well” just as some of her teachers pushed her. When asked to describe her learning differences, Vanita’s first description was of difficulty comprehending what she reads, stating that she has to read information a couple of times to understand it. She also described having difficulty with understanding information given verbally, as well as difficulty with math, writing, and spelling. She described herself as anxious during testing. One of her concerns is the amount of time and effort it takes her to complete readings and homework.

Vera is a 19 year old sophomore in the public relations program. Vera’s explanation of her learning difference began with, “I have dyslexia.” Because this label implies difficulty with reading, she was asked about the type of problems she had with reading. She replied, “Well, I can read perfectly fine.” Instead, she indicated that she has difficulty with speech and math and sometimes transposes letters when she writes. Later in the interview, however, she acknowledged that she also “flips” or transposes letters when she reads, particularly when she is stressed or frustrated. Vera also reported that she doesn’t always hear sounds correctly which gives her particular difficulty during foreign language class and when unfamiliar words are used. She was quick to point out that her differences “meant that I always had to work a little bit harder than everybody else.” Her perception of having to work harder than other students was expressed again when she was asked to describe herself as a student. She said, “I'd call myself a good student. I'm organized. Because I know I have to work harder, I'm always the one to do my homework.”

Test anxiety. Xavier is an 18 year old freshman majoring in health studies with the intent of entering the physical therapy graduate program. When asked to describe his disability, Xavier stated, "I have very bad test anxiety. So, like, when I get to a test I blank out." He also reported that he gets easily distracted in the classroom, but that the distractibility interferes more with test performance than it interferes with classroom learning.

Themes Noted in the Self-Descriptions

The methodology I chose for this study does not require representativeness of the sample, nor does the sampling method I used allow me to claim that these informants are representative of the population of college students with learning disabilities at EFU. At the same time, however, I did feel it important to make a subjective judgment related to whether or not these informants were similar to other college students with learning disabilities. In order to make that judgment, I reviewed studies that used a similar interview process to obtain information on the personal experiences of college students with learning disabilities, comparing the themes that emerged from the self-descriptions of the informants with the themes identified in that literature.

The learning disability label. I did not want my research practices to affirm the ability vs. disability dichotomy that results from socially constructed labels. I therefore did not look at documentation related to the informants' learning disabilities but chose to focus on the informants' self-descriptions or personal constructions of their learning differences. Several authors (Ferri, 2004; Graham & Grieshaber, 2008) suggest that the label, or social construction, provides a lens through which students and educational personnel interpret experiences. Ferri (2004) further suggests that the predominant

discourse, in this case the medical model of disability, provides a ready-made language that is easier to use when attempting to share an understanding of what it means to be learning disabled. The fact that many of the informants used their learning disability label in their self-description would support this contention. For the most part the informants' self-descriptions were consistent with their label as described in the literature. The question, of course, is whether these consistencies are the result of years of being labeled and told by educators what their disability entailed, or are indeed reflective of the students' unique learning differences. Most informants described a primary difficulty however several reported multiple differences that they needed to accommodate to in order to learn. One of the most obvious differences between informants was the age they were when the learning diagnosis was identified. While some informants were identified in elementary school, others were identified in high school. Lauren was identified in college.

Common experiences. Several commonalities were noted in the informants' self-descriptions of their learning experiences. Many of the informants reported that they had to work longer and harder than they perceived their peers to be working in order to learn. This theme is consistent with literature reporting self-descriptions of students with learning disabilities (Denhart, 2008). Almost all informants indicated that they used specific strategies to help them learn. One strategy reported by almost all informants was to make use of the college-provided accommodations. The most common accommodation was using a separate room and extended time for testing, however, other accommodations were also reported such as note-taker, use of a calculator and computer during testing, a reader for tests, and rephrasing of test questions. Among these

informants, using accommodations was generally a positive experience. In contrast to Denhart (2008), the informants in this study reported that they had no negative attitudes or experiences asking for accommodations at EFU, although several students indicated this were not always true in their past educational experiences. A number of the informants indicated that the services of the personnel in the Disability Services Office, including support and help with study strategies, were critical to their success. This need for support in order to be successful is consistent with Denhart's (2008) findings.

Some informants indicated that they didn't use their accommodations. Adam indicated that in the past he felt he was being treated differently from other people when given accommodations. He didn't use them because he wanted to "try and be as normal as possible." Andy Mark reported,"(I didn't) want to be the one leaving the room (for taking tests separately). It's like being in front of other people admitting that I have a learning disability and I really didn't want to do it." Andy Mark, as well as other informants, indicated that in college he had begun to view the accommodations as an advantage. Several informants questioned their learning differences, suggesting that they had adapted to them, outgrown them, or no longer had any differences that interfered with learning. For these informants, use of accommodations was inconsistent or infrequent.

Self-perceptions. The informants' self-descriptions included both positive and negative statements. For instance, Amanda Marie Ruth indicated she had "excellent talking skills" that would help her in her future career in communications. Several informants talked about themselves as "hard workers." Other terms used in the self-descriptions were less positive including "slow learner," "procrastinator," and "lazy."

While some informants reported that they were very willing to discuss their differences with friends, professors, and bosses, other informants indicated they felt negatively about their learning differences and had difficulty talking about them to others or advocating for themselves. This type of negative self-image and negative self-talk has been described by other researchers (Denhart, 2008; Rodis, Garrod, & Boscardin, 2001).

Impact on life activities. A topic not discussed in the literature was the impact of learning differences outside the classroom. While few informants reported any difficulty outside the classroom, Rianna admitted to "flipping" numbers when clerking at a grocery store. Alicia Yolanda reported being distractible when driving, and Vanita admitted that she sometimes doesn't get directions, jokes or stories that others tell her. Sarah indicated that she asked so many questions of her supervisors when starting a job that they were concerned about her ability.

Conclusion

The informants presented with varied abilities to describe their learning differences, varied levels of insight regarding those differences, and varied strategies to deal with those differences. They expressed both positive and negative feelings towards themselves, their present college experience, and their futures. The reader is reminded that the volunteer nature of recruitment does not allow me to make the claim that these informants are representative of college students with learning disabilities. I was reassured that the informants in this study were similar to other college students with learning disabilities, however, in that their voices echoed many of the same themes found in the literature relaying narratives of individuals with learning disabilities (Connor, 2009; Rodis, Garrod, &Bosgardin, 2001).

It was not the intent of this study to explore the informants' stories, but such a study might be helpful in illuminating the everyday experiences on a college campus that can be both helpful and not helpful in meeting the needs of these students. This theme of helpful and not helpful experiences also emerged from an analysis of the think-aloud online sessions and forms part of the discussion in *Chapters VI* and *VII*. In *Chapter V*, I discuss the categories of codes that were identified through the constant comparison analysis of task performance during the think-aloud sessions.

Chapter V

Analysis of Task Performance

Introduction

In this chapter, I define and describe the conceptual codes and framework that I perceived in the data I collected. One of the most helpful analysis processes used early in this study was developing an abstract situational map (Clarke, 2005). This type of map is intended to begin the analysis by simply getting down on paper all "analytically pertinent human, non-human, material, and symbolic/discursive elements of a particular situation" (p. 87). This map led me to posit five major categories of codes: (1) codes related to the task (e.g., purpose, process, procedure); (2) codes related to the informants as human beings (e.g., knowledge, emotions, interests); (3) codes related to the performance of the informants on the tasks and the results of that performance (e.g., actions, strategies, success, not success); (4) codes related to the computer hardware and physical context in which task performance occurred (e.g., hardware, software, features of the room); and (5) codes related to the virtual (online) environment in which the task occurred (e.g., appearance, navigational features, input devices).

In subsequent analysis, codes related to the computer hardware and physical context were found to lend little to the framework that was developing. These codes were therefore subsumed under other categories. For example, while a few informant comments were coded "technology," these comments were about "glitches" that occurred during the informants' day-to-day life (e.g., unable to connect to the library from the residence hall). The codes related to technology were therefore most often subsumed under the category of codes pertaining to the virtual campus. Also in this category

initially were codes related to informants' use of the mouse. For example, some informants were initially labeled "fast mousers" because of the speed with which they used the mouse, while others were identified as "deliberate mousers" for a slower, more deliberate use of the mouse. When comparing the performance of the informants on the tasks, however, the speed of mouse use did not seem to impact the effectiveness of performance but rather suggested that most informants used the mouse in ways related to the task, their comfort with the task, and webpage appearance rather than demonstrating a consistent style of mouse usage. These codes were therefore subsumed under other categories.

The fact that few codes emerged related to the physical context is most likely due to the fact that all think-aloud sessions were conducted in the same physical context. Although stage one informants used a laptop and informants in stage two used a desktop computer, all informants used a similar sized monitor screen and mouse. From their perspective, the website appeared the same. The room and desk set-up were also arranged similarly for all informants. This limited variation may have contributed to the sense that physical context was unimportant to performance. The impact of physical context on performance carried out in residence hall rooms, computer work stations, dining halls, campus pubs, and in classrooms, however, is likely an important consideration for future research.

The remaining four categories remained robust throughout the remainder of the analysis. In this chapter, I introduce a framework, based on codes related to the task and to the performance of the informants on these tasks. Further discussion of codes related

to the virtual (online) environment in which the task occurred and codes related to the informants as human beings will be found in *Chapters VI* and *VII*, respectively.

Codes Related to the Task

Just prior to beginning the think-aloud sessions, informants were asked what they do on the EFU virtual campus. None of the informants indicated that they use the virtual campus to simply explore for information. Rather they use the virtual campus for specific goals such as gaining access to email or their online course materials. While it is probable that students at times explore the EFU virtual campus, I made the decision in stage one not to look at these explorative behaviors but rather to focus on task-oriented behaviors. I have labeled the process used during these task-oriented experiences as *Doing Business*.

Doing Business requires students to find specific information and/or interact with the virtual campus to carry out specific tasks. GTM as originally conceived by Glaser and Strauss (1967) was intended to discover a basic social process that has the potential of transcending the study context. While *Doing Business* may indeed be such a basic process transcending the virtual campus to other web environments, I make no claims that this is the case. For this study, I conceive of *Doing Business* as carrying out tasks related to the role of a college student. The list of tasks chosen for the think-aloud sessions therefore included those I perceived, based on my experiences with college students, to be related to that role. The list of tasks was included in Chapter III (Table 6) but is repeated below for the readers' convenience (Table 12).

I also made the decision to allow informants to make choices related to the content of the specific task. For instance, I asked the informants to locate the homepage of their own academic department. I also asked them to search for a textbook related to a

course of their choice. While this lack of consistency between informants would be unacceptable in a more quantitative approach to this study, the advantage of individualizing the tasks was seen as an advantage to engaging student motivation and effort.

Table 12

Tasks for the Think Aloud Session

- Describing the EFU homepage;
- Locating and then describing the homepage of the informants' academic (major) department homepage;
- Accessing the online course schedule and locating information related to a course in preparation for semester registration;
- Locating the text required for a course through the online bookstore;
- Identifying a book, on a topic chosen by the informant, from the online library catalog;
- Identifying a journal article, on a topic chosen by the informant, from the online library database service;
- Locating the date and time of an athletic game;
- Finding the time of the informants' last final exam for the semester;
- Viewing an online research tutorial based on the library homepage (stage one); or locating the email address of an instructor (stage two).

In analyzing informant performance on these tasks, I used a flow-chart analysis process to better compare informant performance (see Appendix E for a sample flow-chart). Using the constant comparison analysis process, I compared the flowcharts of informants. This comparison led me to describe a general process, *Doing Business*, which captured the commonalities of informants' performance. *Doing Business* includes three general sub-processes: (1) *Finding Place*, (2) *Finding Information*, and (3) *Doing* (inputting information). Figure 4 below is a graphical representation of *Doing Business*. In the discussion that follows, the sub-processes of *Doing Business* are described.

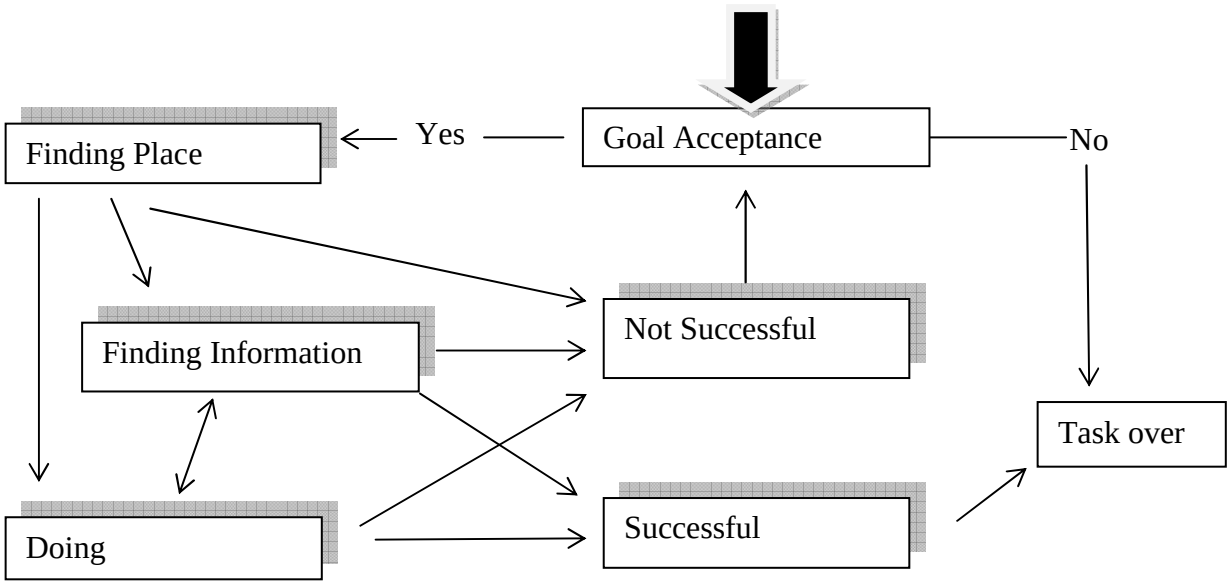


Figure 4. Process of *Doing Business*

Finding Place. For all tasks during the think aloud sessions, *Doing Business* required that the informants first find the webpage or "place" in which to do that business. *Finding Place* is therefore defined as locating the webpage on which the goal of the task could be achieved. If *Finding Place* was not successful, then the task was not completed successfully.

For many of the tasks, the informants knew where to *Find Place*. For other tasks, the informants had to search for the relevant webpage. In these instances, *Finding Place* involved a cognitive process in which a link, labeled with a word or phrase perceived to be related to the task, was selected. For instance, all informants knew that looking for the next home game of an athletic team required them to go to the athletic homepage link. This initial step in *Finding Place* was performed successfully by all informants. The exact page on the athletic site that included the team schedule required the informants to search for links that related to 'schedule' and to the specific sports team they were interested in watching. While most informants moved deliberately through this process, one informant had difficulty finding the related links and one was not successful in *Finding Place*.

Once the informants were successful in *Finding Place*, they engaged in behaviors intended to achieve the goal. These behaviors were categorized as belonging to one of two types of sub-processes: (1) *Finding Information*, and (2) *Doing*.

Finding information. College students may simply be looking for general information when *Doing Business*. For instance, Raeann Yamina reported that she found information on the physical therapy homepage that helped her decide to switch her major. Tara Xu, who is very involved in her sorority, demonstrated how she used the student affairs webpage to find information about activities of the Greek organizations on campus. At other times, college students are looking for very specific information. For instance, Andy Mark looked at the accounting homepage to find information on how to apply for admission. Rebecca Talia looked at the human resources webpage for information on how to apply for a work-study position. In the initial analysis, these two

types of information seeking were coded as separate processes. However, procedural steps were similar and in the final framework, I chose to include them together in the category of *Finding Information*. Note that *Finding Information* is intended to refer to informant performance once the relevant webpage is found. Similar to the process of *Finding Place*, *Finding Information* involves a cognitive process of matching what is being looked for with the content of the webpage (words, pictures). For instance, when searching for the final exam schedule, informants searched for their specific class time in a table on the final exam page. Successful performance when *Finding Information* involved both informant behaviors such as scanning and scrolling, and features of the webpage such as tables, text, and graphics. Frequently, informants were noted to make the judgment that the page they were currently on did not include the information they were seeking, and they would return to the sub-process of *Finding Place.*

Doing. The Doing process requires that college students interact with the virtual campus by inputting information. This may mean that students click on a specific link, select one option from a list on a pull-down menu or input information via the keyboard. *Doing* requires the student to have knowledge of both the information to be inputted and the procedure of how to input it. *Doing* and *Finding Information* were often performed in an iterative manner. As informants engaged in *Doing*, they would find that they needed to know certain information in order to complete the inputting process. At such times, they would engage in *Finding Information* before returning to *Doing*. For instance, when Rebecca Talia couldn't remember the class section she needed to input on the bookstore page, she returned to the class schedule, located the section letter, and then returned to the bookstore page and resumed *Doing*. *Doing* also requires that the student know how to

carry out the steps or procedure for inputting information. For instance, the *Doing* task of identifying a textbook in the online bookstore requires inputting semester, course prefix, course number, and course section by clicking the correct information in a series of pull-down menu boxes. Performance on *Doing* tasks, while involving informant knowledge and behaviors, also was impacted by the way in which the input devices were organized on the webpage and the amount of information provided by those input devices (e.g., drop down menus, search boxes).

Goal acceptance. When faced with a goal-based task, informants had to first make the decision to engage in the task. I labeled this decision *Goal Acceptance* in the process framework. During the think-aloud sessions, all informants initially accepted the goal of the task I gave them. In the daily life of college students, goal acceptance is most likely influenced by a number of factors. For instance, Tara Xu indicated she had never purchased her books from the online bookstore because she wasn't sure how to do it and walking to the bookstore was "easy."

Some informants chose to revoke *Goal Acceptance* during the think-aloud sessions. For example, Tammy made one attempt to find a book in the library by typing 'criminals' into the database search box. When the 'no results' message was displayed, she made the decision to no longer search for a book, revoking her goal acceptance. During the think-aloud sessions, several of the informants needed my encouragement to continue to perform a task. For instance, Rianna had to be told that the link to the final exam schedule was on the webpage she was viewing in order to continue searching for it. It is suspected that my presence caused several of the informants to delay revoking their *Goal Acceptance* longer than if they were working on their own.

Goal Acceptance became important to my thinking about the process of *Doing Business*. Codes related to revoking *Goal Acceptance* tended to be emotions (e.g., frustration, confusion, irritation) or were related to a perception that the task involved excessive time or effort. Revoking *Goal Acceptance* also occurred almost exclusively when tasks were unfamiliar to the informant. The one exception in the data I collected was Rebecca Talia who, getting lost when *Finding Place*, was not successful in finding a book on the library website although she worked there as a student employee and did the task almost daily. She gave up (revoked *Goal Acceptance*) when she became frustrated with the task.

Codes Related to the Performance of the Informants

One of the decisions I made early in stage one was to intervene when informants became frustrated with the task or were having so much difficulty that in my judgment they were about to revoke goal acceptance. I acknowledge that the decision to intervene was a subjective decision that may have influenced the results of this study. The alternative, to allow the informant to continue under such conditions, however, was inconsistent with the respectful approach I had chosen to use toward the informants and had the potential to impact continued motivation and effort negatively. I often used the opportunity of not successful performance to teach the task, providing a value-added approach to their experience.

For this study, "successful" performance is defined as achieving the goal of *Doing Business* without any assistance. In the think-aloud sessions, informants were successful if they were able to complete the tasks without my intervention. This means that successful performance varied as long as the goal was achieved.

"Not successful" is defined as not being able to achieve the goal of *Doing Business* without assistance. During the think-aloud sessions, my intervention most often took the form of encouragement. Occasionally, however, informants looked to me for more help. For instance, Vera, looking for the textbook for PSY211 selected PHY (physics) when selecting the course prefix. Identifying that she had made a wrong choice, she went back to the menu box but asked for help in identifying PSY. Vanita was unable to locate the database search page on the library homepage. Rather than allow her to give up, I gave her directions to the page and then asked her to complete the search for an article on her own.

Table 13 details the frequency of successful and not successful performance on each of the think-aloud tasks. I used this information to compare successful performance with not successful performance; a comparison that pointed me to "helpful" and "not helpful" features of the virtual campus (*Chapter VI*) as well as factors related to the informants (*Chapter VII*).

When informants were not successful during the think-aloud sessions, I asked them what they would do if they needed to complete the task in their daily life outside the research experience (e.g., locate a journal article for a research paper). The typical response was that they would seek out help from friends, roommates, or college staff. A few informants indicated they had occasionally used the online services for such help. Help seeking behaviors will be further discussed in *Chapter VII* but a comment here about help seeking is considered worthwhile.

I wish to acknowledge that in the daily life of a student, outside this research environment, using help in order to complete a task suggests a resourcefulness that is to

be admired and encouraged. Performance using such resources should be considered successful. Accessing such resources, however, is costly in terms of time, effort, and perhaps self-esteem and confidence. When determining the accessibility of the virtual campus, the more students need such external support, the less accessible that environment should be considered.

Research questions

The overarching research question guiding this study is: How do college students with learning disabilities experience services provided by a virtual campus? The short answer, based on the analysis described in this chapter, is that the informants in this study had both successful and not successful experiences when performing tasks on the virtual campus. While most informants were successful on a majority of the tasks, instances of not successful performance were frequent. Given that the tasks used during the think-aloud sessions are tasks that are expected of college students, these not successful experiences require further analysis. In the chapters that follow, those features of the virtual campus and those factors inherent to the informants will be described in an attempt to determine how they contributed to successful and not successful experiences.

As is expected in GTM studies, **s**ubquestions were suggested as data analysis proceeded (Glaser, 1992). One sub-question was added to the over-arching research question following analysis of task performance: What factors contribute to the successful and not successful performance of college students with learning disabilities as they *Do Business* on the virtual campus?

Table 13

Successful and Not Successful Performance When Doing Business (n = 16)

Task	Successful n (%)	Not Successful n (%)
Locating the homepage of the informants' academic (major) department homepage	13 (81.25%)	3 (18.75%)
Accessing the online course schedule and locating information related to a course in preparation for semester registration	14 (87.5%)	2 (12.5%)
Locating the text required for a course through the online bookstore	14 (87.5%)	2 (12.5%)
Identifying a book, on a topic chosen by the informant, from the online library catalog	13 (81.25%)	3 (18.75%)
Identifying a journal article, on a topic chosen by the informant, from the online library database service	8 (50.0%)	8 (50.0%)
Locating the date and time of an athletic game	15 (93.75%)	1 (6.25%)
Finding the time of the informants' last final exam for the semester	9 (56.25%)	7 (43.75%)
Locating the email address of a professor (n = 13)	12 (92.31%)	1 (7.69%)

Conclusion

I do not claim that this study has uncovered a new process(es). For instance, Li and Belkin (2008) and Xie (2009), both working in the area of information retrieval systems design, use a classification scheme of online tasks that includes *information search tasks* and *work tasks*. Xie's description of the dimensions of *work tasks* is similar to my description of *Doing* tasks. Dimensions of information search tasks share fewer

similarities except for one dimension, looking for specific information, which is clearly related to *Finding Information.*

I do claim that this study provides support for the presence of a common process used by the informants of this study within the relatively unstudied context of the virtual campus. It is my intent to use this basic process to further discuss codes related to both the virtual campus (*Chapter VI*) and to the informants (*Chapter VII*), describing those features that helped or hindered students' successful performance on tasks involved in *Doing Business* on the EFU virtual campus.

Chapter VI

The Virtual Campus: Helpful and Not Helpful Features

Introduction

In planning this study, it was my intent to add to the literature on accessibility by exploring the experiences of college students with learning disabilities on one virtual campus. The overarching research question that guided this study is: How do college students with learning disabilities experience services provided by a virtual campus? In *Chapter V*, I began to answer this question by stating that the informants experienced instances of both successful and not successful performance. The sub-question suggested by the analysis in *Chapter V* is: What factors contribute to the successful and not successful performance of college students with learning disabilities as they *Do Business* on the virtual campus?

In *Chapter V*, I also described the analysis process used during this study. Open codes fell into four categories, one of which relates to features of the virtual campus. In this chapter, I describe my analysis of those codes, identifying features of the virtual campus that were helpful and features of the virtual campus that were not helpful for successful task performance. This description is organized by subcategories of codes that include web appearance, structure of the webpage, navigational devices, input elements, language, and availability of help features.

General Format of a Webpage on the EFU Virtual Campus

One recommendation from the literature on usable website design is that features of a website, particularly those features related to navigation, remain consistent from page to page (Nielsen, 2000). This recommendation is followed on most pages of the

EFU website. To aid the reader in visualizing informants' task performance, I have included Figure 5 below, a copy of Figure 1 from *Chapter 1*, representing the EFU webpage layout.

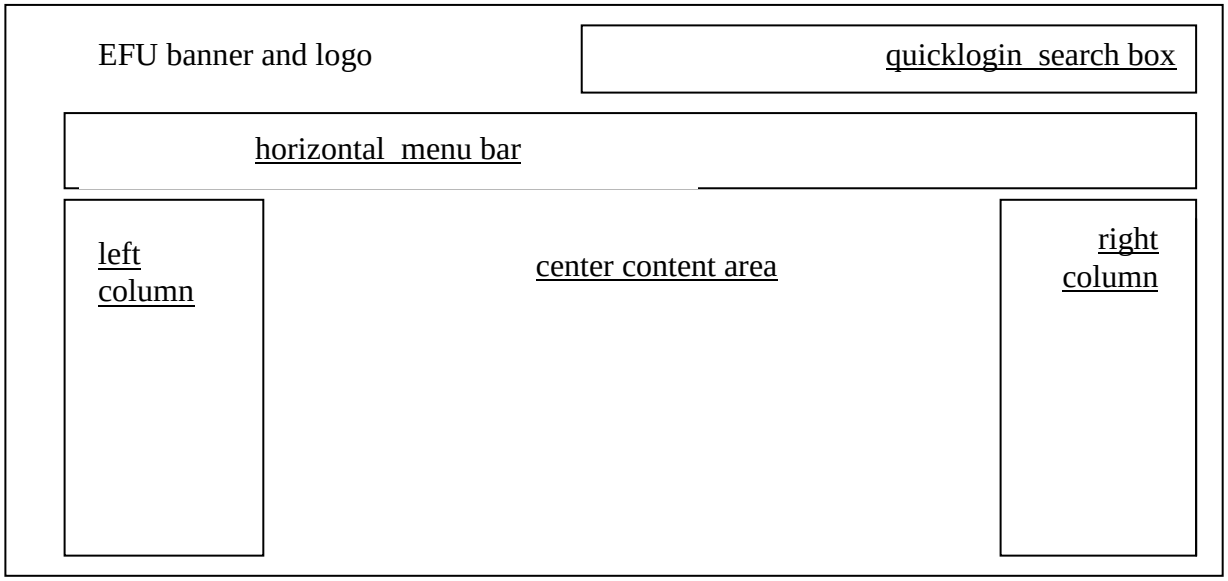


Figure 5. Representation of EFU Webpage Layout.

The navigational feature on the EFU virtual campus that was used most frequently by the informants in this study is the horizontal menu bar that is located about 1/5th of the way down the screen. The horizontal menu bar has ten tabs that serve as links to the homepages of specific college administrative or content sites such as academics, athletics, and library.

The left column includes links relevant to the content of the specific site. For instance, on the library site the left column includes links to "Find an Online Resource," "Borrow and Renew Materials," and "Staff Directory." As the student navigates throughout each site, the links in this left column typically remain unchanged.

The right column is an area where announcements, news stories, and less frequently used links can be found. Links in the right column are usually related to the content of the webpage itself and therefore change as the webpage changes.

Content related to the purpose of the page is presented in the center area. This area is typically text-heavy. Links included in the text are typically identified by underlining and/or coloring. Individual departments make the decision of what information to include in the center area and the format therefore varies significantly from webpage to webpage on the EFU virtual campus.

Features of the Virtual Campus

In analyzing the informants' performance and how it was impacted by the features of the virtual campus, I compared successful and not successful performance, identifying when that performance appeared to be influenced by features of the EFU virtual campus. Codes related to the virtual campus fall into six general sub-categories: (1) webpage appearance, (2) structure of the webpage, (3) navigational devices, (4) input elements, (5) language, and (6) availability of help features. A description of each of these sub-categories is included in Table 14 below. In the sections that follow, each of these codes will be discussed in terms of how they impacted task performance during the think-aloud sessions.

Table 14

Sub-Categories of Codes Related to Features of the Virtual Campus

Subcategory of Code	Description
Webpage appearance	Features related to the appearance of a webpage include color, font, size, spacing, abbreviations and acronyms, icons, pictures and graphics, frame, and amount of text. Webpage appearance was important to the informants' performance of all three sub-processes: *Finding Place, Finding Information,* and *Doing.*
Structure of the webpage	Codes related to how the information on a webpage was organized include consistency of format, page format, and guided input. Structure was important to the informants' performance of all three sub-processes: *Finding Place, Finding Information,* and *Doing.*
Navigational devices	Navigational devices, such as back arrows and links, are used by students to move from one webpage to another when *Finding Place*. A search box is a type of navigational device that is also an input element requiring the inputting of information (*Doing*). Codes include consistency of placement, link appearance, and link labels.
Input elements	*Doing* requires interaction with an input element such as a drop down menu, radio button, or search box. This interaction may require a simple mouse click or involve typing of words/phrases.
Language	The sub-category of language was used to refer to instances where word choice on a link label or within the page content influenced informant performance. Language was important to the informants' performance of *Finding Place.*
Availability of help features	Help features included automatic spelling and searching assist as well as links to online help. Informants' performance of *Finding Place* and *Doing* was impacted by automatic help assistance. Interview data indicated that some of the informants took advantage of online help services. This data was also coded in this subcategory but will be discussed in *Chapter VII.*

Webpage Appearance

In beginning the discussion of features of the virtual campus, I have chosen to start by discussing the code of webpage appearance. I do so because it would appear that appearance can mediate the helpfulness of other features. A link, consistently placed, can still go undetected if its appearance is dull and uninteresting. In contrast, a link placed inconsistently may be noticed if colorful.

Color. Web designers are encouraged to use color to attract attention (Nielsen, 2000). The EFU site uses color inconsistently. Amanda Marie Ruth, pointing to her academic homepage, suggested, if text "was black and the important things were red that would help me a lot." Tara Xu had difficulty finding a link to the psychology faculty on the psychology homepage. She eventually found the link as only one in a whole list of other links and indicated, "It should have been highlighted." Many informants had difficulty finding the link to the final exam schedule, placed in the right column in a gray box with two other links of similar color. The e-shopping icon on the bookstore page, also placed in the right column, is in contrast large and brightly colored and engaged the attention of several of the informant who used it to be successful in *Finding Place* for purchasing textbooks.

Font. Changes in font can also be used as attention gaining devices (Nielsen, 2000). Bold font, underlining, and italicizing were all noted on the EFU virtual campus. Rachel indicated, "I like stuff that's bolded so it sticks out more." She went on to say, "The thing in here that sticks out to me the most is this that's underlined (pointing to an underlined link)."

Size. Small font interfered with performance on some tasks. It was observed that informants leaned toward the computer screen when they accessed the library e-journal listing which is presented in small font. Vera was questioned about what she was doing on this page as she seemed to be taking a long time on the task. She indicated, "(I am) trying to read some of the little, small paragraph." Xavier found similar issues with font size on the final exam table stating, "Maybe it's just my eyes, but I think it's small. The letters are just very small. I'm like squinting."

Rachel was able to locate a full text pdf copy of an article on the database holdings page. When asked how she found it, she indicated, "[because it was] just that little adobe picture." While Rachel was successful because of the presence of the pdf icon, her words give a clue as to the reason Andy Mark was not successful. Andy Mark quickly and deliberately clicked on the title of an article that seemed interesting to him which resulted in retrieving the abstract. When asked how he might get the full text of the article, he said, "I'm not sure. Every time I've used an article, I've just gotten the abstract." When the "little adobe" (Rachel's words) pdf icon was pointed out to him, he said, "Oh wow, I didn't know that was there."

Spacing. Spacing of text was an issue for some of the informants. Rebecca Talia had difficulty with the list of databases page. She stated, "I don't like it. It's too hacked [sic], like too small, and too, I don't know, just not for me. (I) wish it were spread out more." While several of the informants indicated the list of courses page was well organized and easy to read, Amanda Marie Ruth disagreed, indicating "I think these (pointing to the items on one line) should be spaced a little more." Xavier agreed. While

also on the list of courses page, he stated, “The one thing that I can see confusing is the spacing, cause like this is all so close.”

Use of abbreviations and acronyms. The code of language was used initially to refer to performance impacted by the discipline abbreviations used on the course schedule page and the bookstore page. Further analysis, however, suggests that the difficulty was not in understanding the word choice but in actually seeing the differences in the letters. For example, Vera was not successful in *Doing* the course schedule task because she had difficulty distinguishing between several course abbreviations. She attempted to find Philosophy 108 (PHI) but she scrolled past PHI in the pull-down menu, hesitated briefly on physics (PHY), went up to physical therapy (PHT) and then back down and selected psychology (PSY). She continued to scroll, pausing momentarily on psychology child life (PCL) and public relations (PRC) before deciding that her choice of PSY was correct. She moved on to the course number search box, typing in 108. She received an error message because there is no Psychology 108. She was then asked to locate anthropology (ANT) 415 and was able to successfully complete the task without difficulty.

Icons, pictures, graphics. Much of the textbook selection page on the bookstore site is devoted to product advertisements unrelated to textbooks (e.g., clothing, blankets). Given the marketing function of this page, it is no surprise that colors, pictures, and other attention getting devices are an obvious characteristic. Vera was silent and unengaged for a period of time during the task of finding a book on the bookstore page. When asked what she was doing, she indicated that she was “shopping,” her attention having been attracted to pictures of the merchandise displayed on the page. While in this instance the

pictures were useful to the marketing function of the bookstore, they were not helpful for performance of the task of locating a textbook.

At least some of the informants indicated that they found icons helpful. Andy Mark found the soccer schedule quickly, indicating "I saw the sports emblem on the left and soccer must be that way." Tara Xu searched briefly for her sorority on the student affairs homepage, which includes the logos for the different fraternities/sororities in the right column. She noted that it would be easier if the logos for the fraternities/sororities were links as she had difficulty finding the labeled link in the center area.

Pictures were typically described as attention getting. For example, talking about the EFU homepage, Andy Mark reported, "The pictures are pretty cool. At least they're the first thing(sic) I look at when I look at (the homepage)." The informants also indicated, however, that they like the pictures to change on a regular basis. For example, Tara Xu didn't like the fact that the pictures on the student affairs page and EFU homepage weren't updated consistently. She also expressed the wish that the pictures on the EFU website included more student activities.

Frame. The term "frame" is used to refer to that portion of the webpage that is viewable without scrolling. Informants during the think-aloud sessions used the scroll feature, but occasionally missed important information by not scrolling far enough. For instance, when searching for a book on the library website, students are faced with a list of library holdings that includes many different types of media (e.g., texts, DVDs, videos). While students can use a second search box to limit their library search by type of media, this box is located at the bottom of the page. Xavier's list was quite long when he performed this task. He scrolled only part of the way down, realized he was looking at

primarily DVD and VHS media, and returned to the top, looking for a way to limit his search. He never saw the second search box at the bottom of the page. A number of informants, facing long text on their academic homepages, also scrolled only part way down the page before returning to the top.

Amount of text. Several of the informants indicated that the amount of text on a page is sometimes daunting. For instance, Xavier indicated that when faced with a lot of text, "I'd just go to the links. Just because it's a short cut. I think it's easier to find things that way, kind of like a lot of pages have a lot of information but you can just click on the link and it brings you down to that information rather than scroll all the way down. I think it is just easier to click, less time consuming." The cluttered appearance of the left column on some pages was a problem for several informants during the think-aloud sessions. When asked to describe the library page, Xavier stated, "I feel like there's a lot going on the left side with all the links and stuff."

Structure of the Webpage

Consistency of format. Informants found the consistency of structure to be helpful when *Finding Place*. When asked about the appearance of the EFU homepage, informants talked instead about the ease of finding information. Rebecca Talia reported, "The layout is pretty easy for the most part." I asked, "What makes it easy?" She replied, "If you're having trouble finding something it's pretty easy to find...everything is like in its own spot."

Page format. Structure was also used to code instances in which the way information was organized on a webpage influenced *Finding Information*. The structure of the final exam page was found not helpful for several of the informants engaged in

Finding Information about their final exam time. This page includes a table cross listing the final exam time by the time the class typically meets. This page was used with varied success. Vera, Alicia Yolanda, and Xavier slowly moved down the table taking each row in order and located their exams accurately with minimal searching. Andy Mark, on the other hand, scrolled up and down quickly several times before finally selecting his exam time. Amanda Marie Ruth indicated that she had looked at this screen before and reported, "It didn't make sense to me the first semester. I was like, what does this mean? I was confused. But I get it (now)." When asked how she got it, she indicated, "I had to sit there and kind of really read it, and look at it." Other informants were not successful on this task. Once on the final exam page, Rebecca Talia incorrectly identified her exam time. Tara Xu gave up before finding her exam time. Raeann Yamina expressed frustration with the table because one of her courses wasn't found because it met at an unusual time.

Guided input. One of the most helpful features of the virtual campus when *Doing* included an organization to the page that "guided" the student through the steps of *Doing*. A top-down structure for input elements was noted on the textbook selection page, the directory, and the course schedule page. All informants followed this top-down order on the directory and textbook selection page. All but one informant used the top-down order on the course schedule page. That one informant chose a bottom-up sequence. All informants successfully performed the *Doing* process of both tasks. The wording used to label the input elements most likely also helped with successful performance. Word choice when labeling links and input elements is discussed below under the code of language.

The placement of search boxes on the library homepage in contrast is similar in appearance to the three tasks above in that a series of search boxes is placed vertically. The process of *Doing* when searching for either a book or a journal article, however, does not follow this type of top-down/bottom-up sequence. Rather, the student has to choose which box is relevant. *Finding Place* for these two tasks was performed with difficulty or not successfully by many of the informants. For instance, Xavier and Sarah entered search terms into the database selection search box, the top box, as if they were already in the database. Alicia Yolanda did not even attempt to find a database saying, "I have no idea what's going on, what I'm looking at."

Navigational Devices

Consistency of placement. Informants used the EFU homepage during the think-aloud sessions as a navigational hub or as a way to get to other pages. Several of the informants during the think-aloud sessions went back to the EFU Homepage at the start of each task as a strategy to *Find Place*. This occurred even when the informant could have started the search from the page they were already on.

Informants spoke specifically about the helpfulness of the horizontal menu bar. This feature, located at the top of almost all pages, was the feature most informants used to start the process of *Finding Place*. The tabs on the horizontal menu bar linked informants to the major sites on the EFU virtual campus. As Rebecca Talia pointed out, "For the most part, pretty much everything is on the top, all the important (links)." Because informants were used to the consistency of having the horizontal menu bar on the webpage, its absence was found to be not helpful. On several of the athletic site pages, the horizontal menu bar is not present. During the task of finding the schedule of

an athletic team, Amanda Marie Ruth pointed out, “Right now, I don’t know how to get back to the (home)page...I’m stuck.” She eventually used the back arrow to leave the athletic site.

The left column was also used frequently to *Find Place.* Once the homepage of a site was found, typically through the use of the horizontal menu bar, many informants continued the search for *Finding Place* by scanning the links in this left column. For example, in order to find the schedule of an athletic team, most informants found the link to the athletic homepage on the horizontal menu bar and then searched the left column on the athletic homepage for the link to the specific athletic team page. From the team page, they again scanned the left column for the link to the team’s schedule. Andy Mark attributed this to the fact that “(I)t’s like reading, you read left to right. So I start on the left and go to the right.”

While most important links are located in the left column, two tasks had important links located in the right column; identifying a textbook in the online bookstore and locating the final exam schedule. The bookstore has an e-shopping icon link to the textbook selection page in the right column, however, there is also a link to that webpage in the left column. Informants’ performance differed in that several of the informants chose the link on the left and others chose the e-shopping icon link on the right.

When informants were asked to locate their final exam schedule, all but two informants had difficulty finding the link which is only located in the right column. Most of the informants engaged in extensive searching in an attempt to find place, often through the links located in the left column. When asked what was the most difficult task performed during the think-aloud session, Rebecca Talia indicated, “(The exam schedule

because) they actually had the link on the right hand side, even though it was in a box and highlighted and everything. I'm usually drawn to the left. I didn't see it on the right hand side."

Link appearance. The helpfulness of the consistency of link placement appears however to be mediated by the appearance of the link. When links were clearly indicated (underlining, different color) *Finding Place* was more successful regardless of the positioning of the link. In contrast, when links were difficult to see, informants had more difficulty and were at times not successful even if the link was in the left column.

Link labels. The words used to label links also presented a problem to informants. Some performance seemed to be linked to a difficulty with understanding the meaning of the label. These instances are discussed under the code of language below. Another problem with navigation links was incomplete information. For instance, the list of library holdings includes all media, not just books. Xavier noted that he wasn't sure what links on the list were books because, although the list clearly indicates when a holding is a DVD, VHS, or microfilm, it does not indicate when it is a book. He pointed out, "See, this I know is a VHS, this is a DVD, but these things could be a magazine, it could be almost anything. It may not be a book."

Multiple paths. A notable feature of informants' performances during the think-aloud sessions was the variety of links that could be used to *Find Place* when completing many of the tasks. It is assumed that this variability was helpful in that it allowed the informants to be successful in *Finding Place* despite individual differences in experience, knowledge, and perception. For example, all but one informant was successful in finding the textbook selection page, but, as previously described, some of the informants used the

left link and others the right link on the bookstore homepage. At least one of the informants was consciously aware of these multiple paths or options. When asked to find the next home game of the volleyball team, Rebecca Talia stated, "You could do multiple options."

Input elements

Five of the tasks used during the think-aloud session required *Doing*. When the informants knew what information to select or place in the input device, the process of *Doing* was typically performed in a deliberate and efficient manner.

Pull-down menus and radio buttons. *Doing* tasks involving drop-down menus and radio buttons were performed almost uniformly with success. This was particularly true when the input was limited only to relevant choices. For instance, the textbook selection page limits choices in the menu boxes based on previous input. When describing the bookstore procedure, Lauren indicated, "It's pretty self-explanatory. I mean it pops up for you and gives you the options. You don't have to wade through everybody's options."

Search boxes. For some tasks, search boxes were used successfully. For example, once informants were successful in *Finding Place* when searching for a library book, all were able to type a search term I judged to be relevant to their topic in the search box. A disadvantage to the use of search boxes is that the informants did not always know what information was required. For example, when Vera was unable to *Find Place* when searching for a book on the library site, she tried the search box. She typed "find a book" into the search box and was presented with a list of links with that phrase, but most links were unrelated to the library. Although successful on the task of

searching for an article, Lauren had an explanation for some of the difficulties informants experienced on this task. She indicated, “Finding the right key phrase is really important. Cause it’s really hard to do. For example, I’ve done a paper on Tay-Sachs. Well, do you use the dash? Or not? You get different papers if you put the dash in or take the dash out or if you capitalize letters or if you put an ‘s’ on the end. So it depends on what phrase you’re using. It’s hard to find papers if you don’t know what phrase you’re using.”

The one *Doing* task that was not successful for many of the informants was selecting a database when attempting the task of finding a journal article. Most informants did not appear to have an understanding of how a database search is implemented, even though they used the term “database” in their description of what they were doing. Those informants that were not successful typically skipped the step of selecting a database, typing their search term into the database selection search box. While options are available to help with database selection, most informants, even those that were successful on this task, did not make use of these options. For instance, students can select the first letter of the title of a database or the subject indexed by a database, and the database selection screen will provide a list of appropriate databases. Only Rebecca Talia used one of these options, selecting “Education” from the menu of subjects for her topic of adolescence.

Informants who were successful on the task of finding a journal article indicated they were familiar with the task. In contrast, informants who were not successful on the task indicated they rarely or never used the library to locate an article. This concept of familiarity was noted to be helpful on other tasks as well and will be further discussed in *Chapter VII*.

Language

Information on the EFU website is presented primarily through text. Word choice when writing text for the web has been cited as critical for usability (Nielsen, 2000). Performance was both helped and not helped by the specific choice of wording on the tabs of the horizontal menu bar. When *Finding Place* for the task of locating an athletic schedule, all informants went deliberately to the athletic tab on the horizontal menu bar. Informants also consistently chose the library tab when *Finding Place* for the library tasks. In contrast, the academic tab on the horizontal menu bar was used inefficiently by many of the informants. Frequently, informants looked at other tabs before selecting the academics tab. The selection of this tab was often tentative with the informants using the pull-down menu to look through the possible links before actually deciding to select it. For the task of locating her academic homepage, Tara Xu pulled down the menu on the academic link several times before finally selecting it. She indicated that she thought of academics as having to do with "academic awards." The academics tab was also the link that had to be used when *Finding Place* during the final exam schedule task. Again, most informants looked through a number of tabs on the horizontal menu bar before selecting the academic tab. Xavier, not successful in *Finding Place* after looking through the academic tab several times, finally resorted to using the search box to find the final exam page.

I identified the possible importance of language in stage one, which led me to ask specifically about the labeling of the tabs on the horizontal menu bar during stage two. Asked about the labels on the tabs, informants uniformly answered that they understood the labels, yet their performance suggests otherwise. Lauren provided the best insight

when she stated, “They make sense if you kind of know what you’re looking for. Like if you want more information about ‘oh, where do I apply’ then clearly Admissions. Or if you need to find quick information about EFU, then you can go quick and click on (the link to) EFU.” When asked if she could find information about “graduation,” she replied, “I could find it. It would be a matter of figuring out whose page it was off of. So is graduation off of the registrar’s page? Is it off of academics? Or is it off of student activities? Like who was it related to?”

When difficulty was experienced by informants on the task of finding a book on the library site, it was consistently due to their difficulty in *Finding Place*. Most of these informants didn’t identify the link labeled “library catalog” as the link they needed to click. For example, although eventually successful in finding a book on the library website, Vera clicked on a number of links including “more resources,” “more services,” “research at EFU,” “more about the library,” and finally “library collections.” This final selection included a link to “go to library collections.” She scanned the list, moving the cursor to hover over “special collections” before continuing up the list and clicking on “general collections.” On the general collections page, she clicked on “type of collections,” then “finding materials,” and finally on the link to “library catalog.” When asked about her search, she indicated, “(I) didn’t read anything about ‘checking a book out,’ or ‘finding a book’.” This same reasoning was expressed by Alicia Yolanda during the task of finding a journal article. After scrolling up and down the left column several times, she indicated that she was searching for the word “articles” and couldn’t find it anywhere.

Labels often seemed to me to be too close in meaning to other labels, which presented a problem for successful task performance. For instance, looking for the course selection page, Rebecca Talia was the only informant that was not successful in *Finding Place* for this task. She went to the academic homepage and found a link in the left column labeled "Fall 2009 courses." This brought up a pdf file listing alphabetically all of the courses offered during the semester rather than the course selection page. She was unable to locate another link on this page with a label that suggested to her that it was a link to the course schedule page.

At times, problems experienced with language were specific to an informant. For instance, on the athletic site, Rebecca Talia clicked on the link for "roster" and was surprised that it was a list of the team members. Adam asked what a "library liaison" was on the library site.

Availability of Help Features

Two types of help features are noted on the EFU website; (1) automatic features such as suggestions for spelling and search terms, and (2) online help services accessed through links on multiple pages of the EFU site. The conscious seeking help through online help services will be discussed in *Chapter VII*. In this section, I discuss the automatic help features.

Spelling of search terms was a problem for several of the informants. The automatic spelling assist was helpful when present, but it is not present on all pages. Vera, searching for "women journalists" spelled out "women jornalists." The database that she was working in returned the question, "Did you mean women journalists?" She was able to proceed with the task. Raeann Yamina, however, had a similar problem with

physical therapy (physical theraphy), but the database she was working in did not return an automatic spelling error, and she was not successful on the task of finding a journal article. She indicated she preferred to search for articles on Google. When asked to demonstrate what she does on Google, she typed 'physical theraphy' into the Google search box. The resulting screen asked 'did you mean physical therapy?' which she clicked and found a number of sites, one of which had a link to an article.

Summary

The following summary is organized by the sub-processes of Finding Place, Finding Information and Doing. Tables 15-17, found at the end of this summary, lists the helpful and not helpful features of the EFU virtual campus for each sub-process.

Finding Place. The horizontal menu bar was effective as a way of *Finding Place*. It was a consistent feature on most webpages on the EFU virtual campus. Informants uniformly used the horizontal menu bar to successfully connect to the athletic homepage, the library homepage, and the directory page. Informants seemed less confident of the information included under the academic tab, often stopping to read the pull down menu before clicking on the link or attempting other means of *Finding Place* such as the search box.

Also helpful for *Finding Place* was the consistent placement of important links in the left column area on most pages of the EFU virtual campus. At times the cluttered appearance of the left column resulted in difficulty identifying specific links, and the language used for link labels appeared to be unclear at times to the informants. Color and underlining of links was also found to be helpful.

While the library homepage was easily found by all informants, *Finding Place* for the specific page needed for completion of the two library tasks was difficult and some informants were not successful on these tasks. Several informants also found the final exam schedule page to be difficult to find. A number of possibilities for these difficulties are proposed that relate to the features of the virtual campus including the labeling of links, presentation of input elements during procedural tasks, and placement of links in the right column. In addition, several informants who used the search box in an attempt to *Find Place* were not successful due to spelling problems and the unavailability of automatic spelling help.

Finding Information. In general, tasks involving *Finding Information* were performed successfully by most of the informants. Some of the informants had difficulty deciphering the structure of the final exam table. Several of the informants who had difficulty in identifying courses on the course schedule page attributed this difficulty to tight spacing of information. Small font on several of the library webpages also made finding information difficult. The informants also cited too much information and a cluttered appearance on some webpages as problems when trying to locate specific information.

Doing. I have characterized the *Doing* process involved in finding a textbook, finding a course, and finding an email address as a "guided" procedure in that the top-down placement of the input boxes guided the informants through the steps. Input was also provided during these tasks with pull down menus and/or checkboxes used to ensure input was appropriate. These guided tasks were almost uniformly performed successfully.

Variations in *Doing* were most noted during the library tasks that lacked this guided characteristic. For one informant, the placement of a second library search box outside the initial frame made the task of locating a book in the library not successful. Several informants were unable to choose the appropriate box to start a database search. The difficulty these informants experienced with the library tasks is of particular concern. According to Oakleaf and VanScy (2010), student learning is the mission of the academic library. Without accessibility and usability of library online services, such learning cannot occur.

Table 15

Finding Place:Helpful and Not Helpful Features on the Virtual Campus

Helpful	Not Helpful
• Consistent navigation devices (horizontal menu bar, left column) • Availability of spelling correction when using search boxes • Use of attention getting devices (color, size, font) for links	• Link placement in right column • Cluttered appearance in left column • Wording used for link-labels too close in meaning and/or of unknown meaning to informants

Table 16

Finding Information: Helpful and Not Helpful Features on the Virtual Campus

Helpful	Not Helpful
• Use of attention getting devices (color, font, icons) to draw attention to information	• Too close spacing • Small font • Confusing structure of final exam table • Missing information on final exam table • Too much text in center column area • Important information located outside frame

Table 17

Doing: Helpful and Not Helpful Features on the Virtual Campus

Helpful	Not Helpful
• Guided procedure – input elements placed in order of procedure • Input provided through pull-down menus or buttons • Spelling correction for search boxes	• Unfamiliar or confusing structure of input elements (database searching)

Conclusion

In the analysis of informants' performance during the think-aloud sessions on the virtual campus, several codes related to features of the virtual campus were identified as important to an understanding of successful and not successful performance. These codes were grouped into sub-categories to include webpage appearance, structure of the webpage, navigation devices, input elements, language, and availability of help features. Within each of these sub-categories, features were found that were both helpful and not helpful. In many instances, the presence of a feature was helpful and its absence was not helpful.

The number of guidelines and standards related to usability is extensive. For instance, the U.S. Department of Health and Human Services (HHS) (2006) published 209 guidelines in categories such as page layout, navigation, scrolling and paging, and text appearance. These guidelines are supported by a review of the research on usability although it should be noted that some guidelines have limited research support. In Chapter II, I pointed out the relationship of accessibility to usability (Henry, 2003). The methodology used in this study does not allow me to state definitively that the experiences of the informants in this study are typical of the experiences of students at EFU (usability), nor can I say that their experiences are typical of the experiences of other students with learning differences (accessibility). Commonalities in performance related to the features of the virtual campus, however, were noted across the performance of these informants, and those commonalities lead me to suspect that other students at EFU would have similar experiences.

For these informants, consistent adherence to usability guidelines would have improved accessibility. When the features of the virtual campus that were identified in this study as influencing performance are compared to these guidelines, the results indicate that when already known principles of usability were followed, informants tended to be successful. When those principles were not followed, informants tended to have difficulty and were at times not successful.

Principles of usability, however, do not explain all of the success or not-success these informants experienced in the virtual campus. For instance, while some informants did not understand the language of the label "library catalog," others did. While some informants did not notice links placed on the right, others noticed these links without difficulty. These individual differences are also important in understanding the experience of these informants in the virtual campus. This finding led to another research question: What do college students with learning disabilities bring to their experience with the virtual campus that contributes to sussessful and not successful performance? This question is discussed in *Chapter VII.*

Chapter VII

The Informants: Factors Impacting Performance

Introduction

The analysis in *Chapter VI* suggested yet another sub-question that will be addressed in this chapter: What do college students with learning disabilities bring to their experience with the virtual campus that contribute to successful and not successful performance? My intent when implementing this study was, as the over-arching research question indicates, to determine if the virtual campus is accessible to students with learning disabilities. If performance cannot be solely understood in terms of the features of the virtual campus, then what the user brings to the interaction needs to be explored. These informants brought to the interaction both challenges (learning differences) and strengths (experience, knowledge, strategies).

I will describe those informant factors that were both helpful and not helpful in achieving successful performance on the virtual campus during the think-aloud sessions. The reader may find this chapter confusing given my foundation on the social model of disability. It would appear that I am veering from that foundation by exploring how the informants' interactions with the virtual campus were impacted by their personal characteristics, to include their learning differences. Yet to not acknowledge those factors inherent to the individual informant is to ignore a piece of this interaction, placing the informants in the role of passive recipient of services.

Codes related to the informants were placed in a category that was identified using the situational map analysis process (Clarke, 2005). Indicators coded "learning differences" were placed in this category as were codes related to the informants'

“interests,” “ emotions,” and “knowledge.” I coded comments and behaviors related to the informants’ technological experiences and expectations as “technological savvy” and “technological expectations” and placed those codes in this category as well.

Another category of codes that emerged during the analysis were those that spoke to the informants’ behaviors or actions during the think-aloud sessions. These actions are seen as critical to understanding the informants’ ability to succeed on the virtual campus and have been coded “strategies for success.” A type of strategy, help seeking, is discussed in this chapter as well. While I did not directly observe help-seeking behaviors during the think-aloud sessions, I asked what the informants would do if they were not successful at completing a task in the virtual campus. The informants’ responses indicated that in day-to-day activities, help seeking is common.

Throughout the study I was concerned that issues with usability and accessibility would not be noted if the informants had either extensive or current experience completing a specific task. As the study progressed, it became clear to me that experience did indeed impact performance, but that the experience did not have to be with the task itself. Successful and not successful performance was sometimes impacted by the perception that the task was similar to something the informant had done previously. To the informant, the task seemed familiar. This code of “familiarity” is therefore also discussed in this chapter.

Learning Differences

The label, learning disability, is applied to those individuals who demonstrate specific differences in the way they experience learning (Fletcher, Morris, & Lyon, 2003). The impetus for this study was my concern that differences in the way students

experience learning in a classroom might also pervade their experiences in other aspects of life, specifically their interactions on the virtual campus. As institutions place services on the virtual campus, a lack of consideration of the needs of students with learning differences might lead to issues of inequity and social injustice if these students do indeed experience difficulty in the online environment.

To lend some support for my assumption that learning differences might impact performance outside the classroom, several of the informants indicated in the initial interview that they felt their learning differences did indeed impact their daily life (see *Chapter IV*). Given this assumption, I would expect that differences or impairments in attention and increased distractibility in the classroom would be seen also when performing tasks on a computer screen. A reading difference that interferes with reading a textbook would most likely also interfere with reading text on a computer screen. I am aware these assumptions are based primarily on my experiences as a clinician and educator, and my understanding of learning differences based on those experiences. I am also aware that my interpretations of informants' performances may have been colored by these assumptions.

There were three ways in which the data were analyzed in an attempt to reduce this bias: (1) I matched students with similar differences in an attempt to identify if they were experiencing similar issues in the virtual campus. It seemed reasonable to me that if the problems faced by the informants were due to their learning differences then informants with similar differences would experience similar problems; (2) I listened to the informants' descriptions during the think-aloud sessions for references to their learning differences; and (3) At the end of the think-aloud sessions, I specifically asked

the informants if their learning differences impacted the way they interacted with the virtual campus. I have organized my discussion below by these three analysis methods.

To focus on an individual's learning difference is to perhaps reinforce the view of a learning disability as a problem needing to be fixed. That is certainly not my intent. The methodology used in this study does not allow me to say with any surety that the not successful performances demonstrated by the informants during the think-aloud sessions were, or were not, due to the informants' learning differences. As already discussed in *Chapter VI*, one of the findings of this study is that already known usability principles can explain many of the successful and not successful experiences of the informants, a finding supportive of the social model of disability.

Comparison of performance by self-perceived learning differences. This section is organized by using the informants' self-descriptions of their learning differences (see *Chapter IV*).

***Attention and distractibility*.** Four informants (Andy Mark, Adam, Amanda Marie Ruth, and Alicia Yolanda) described difficulty attending. These informants also indicated they experienced distractibility which interfered with their ability to focus on what they were doing.

The think-aloud sessions were carried out in a quiet, non-distracting location. The informants were seated at a desk with their back to the room. I made these arrangements in an attempt to ensure privacy of the study informants, but the setting most likely also optimized the environment for those informants who reported that they experience distractibility. Yet all four individuals either reported or demonstrated distractibility during the think-aloud sessions.

Web designers frequently use pictures, colors, different fonts, and other devices to attract attention to important information. For these informants, such attention-getting devices were effective in getting their attention but at the same time interfered with their performance of some tasks. For instance, Andy Mark paused while looking for the schedule of the soccer team to look at the pictures. During the same task, Amanda Marie Ruth reported, "For some reason I'm drawn over to this little area because (the pictures) move. So, I'm over here looking and I get nervous (because) 'it's moving, I can't look over in that direction'. (Yet) I'm still looking at it." She also had difficulty ignoring colors, stating "Down here, this is red. That distracts me."

Both Amanda Marie Ruth and Alicia Yolanda admitted that they get distracted when online. This loss of focus was demonstrated by Adam while searching for a book on the library website. Adam, scrolling down the center column, stopped to hover the cursor over the term "librarian liaison." He asked what a liaison was, and after hearing it was a librarian assigned to a specific academic area, clicked on the link and scrolled through the list, stopping the cursor over the name of the librarian assigned to his major, Government and Politics. At this point, he had to ask what he was looking for again in order to continue with the task. He noted while searching for an article in the library databases that "if I can't find something, I get distracted."

Behaviors associated with attention and distractibility were almost entirely limited to those informants who described themselves as having learning differences in this area. Vera was the only other informant who demonstrated distractibility during the think-aloud sessions. She became distracted during the task of identifying a textbook on the

bookstore page. She paused while trying to find the textbook selection page to peruse the pictures of available clothing, finally redirecting herself to the task of finding a book.

***Reading*.** Six informants reported difficulty with reading (Rhonda, Rebecca Talia, Raeann Yamina, Rianna, Rachel, and Amanda Marie Ruth). In addition, three individuals coded with varied and multiple learning differences (Vera, Vanita, and Vana) described reading difficulties. All of these informants demonstrated some difficulty with reading during the think-aloud sessions, but the tasks with which they had difficulty and how they performed varied. Many informants without self-described learning differences involving reading also demonstrated and/or reported having difficulty with online reading of information. It is therefore unclear if the reading difficulties observed during the think-aloud sessions were related to learning differences, usability issues, or some other factor(s). The discussion below is therefore organized by the performance observed and often refers back to concepts discussed previously in *Chapter VI*.

Organization and spacing of text. Several informants commented on the organization and spacing of text on the webpage. Rebecca Talia indicated that she disliked how the list of databases on the e-journal page was presented. She indicated, "It wasn't organized properly; everything was just in a big huge line of lists, a huge list. I don't like that at all."

Recognition of letters. Individuals with reading differences often have difficulty distinguishing between letters and words that are close in appearance (Gregg et al., 2005). Vera, as described in *Chapter VI*, had difficulty on the course selection page distinguishing between the prefixes for philosophy (PHI), psychology (PSY), physics (PHY), physical therapy (PHT), psychology child life (PCL), and public relations (PRC).

Spelling. Several informants had difficulty with spelling the words they were typing into a search box. Rebecca Talia had trouble with "adolescent" when searching for a book and article on the library page. Vera misspelled "jornalist" when looking for a book on women journalists. When misspellings did occur, informants did not self-correct or recognize their error, often repeating their spelling error on subsequent pages. Raeann Yamina, also on the library page, had trouble with "physical therapy." When her search for a book on "physical theraphy" resulted in a "no results" message, she went to Google to find a book. Using the same spelling, she was successful on Google which corrected her spelling for her.

Amount of text. Raeann Yamina liked navigating the EFU website saying, "It's complicated but if you look hard enough you can find it." When I asked her about what makes it complicated, she said, "Everything you need is online which is nice, but it's also a lot of information to sift through." Other informants echoed this comment of having too much information on the webpage.

***Memory*.** In their initial interview, Andy Mark and Amanda Marie Ruth reported learning differences associated with remembering information presented both orally and in writing. Neither informant reported experiencing difficulty with memory during their think-aloud sessions. However, when informants had difficulty *Doing Business*, memory may have subtlety-impacted performance. All of the tasks during the think-aloud session required the informants to remember information with which to perform. For instance, although Alicia Yolanda indicated, "I know there's an academic calendar somewhere," she needed encouragement to continue looking for it after several unsuccessful attempts at trying to find it.

Memorability is a concept related to usability. This concept refers to the ability of users to remember how to interact with the webpage both while engaged with the site and when returning to the site later (Henry, 2003). While both Andy Mark and Amanda Marie Ruth experienced difficulty carrying out tasks that they reported they had previously performed, other informants, who did not report learning differences related to memory, had similar difficulty. For instance, Rebecca Talia indicated she was on the library website a lot but had difficulty finding the library catalog search page. These observations suggest that while informants' not successful performance may be related to memory differences, another likely explanation rests with the memorability of certain pages on the EFU virtual campus.

***Slowness in Processing Information*.** Two informants described themselves as slow in processing both written and aural information (Sam, Sarah). Sarah was not successful on two tasks, identifying an article from the library and finding her final exam time. Her performance was similar to that demonstrated by other informants. Sam completed all tasks successfully although he displayed some unusual choices during task completion. For example, like most other informants Sam used the EFU homepage as a navigational hub, returning to it as he started each task. However, unlike the other informants, his use of the horizontal menu bar or back arrow was minimal. Instead he typed in the url address of the EFU homepage each time, saying he found it "quicker." He also went to the bookstore site using a link from the athletic site. When asked why he chose that way to get to the bookstore, he shrugged and said it was the way he learned to do it the first time he tried.

Although I have records of the time the informants took on their performance during the think-aloud sessions, the process of talking about what they were doing while performing was observed to slow performance of the informants. I believe that this measure is an invalid indicator of efficient performance and I did not use it in my analysis. For example, based on their self-descriptions of slowness when processing information, I anticipated that Sam and Sarah might take a longer time to complete the think-aloud session. Sam's descriptions of what he was thinking, however, were short and concise and he performed the tasks in one of the shorter sessions.

***Math*.** Two informants indicated primary differences with mathematical concepts and calculations (Tammy, Tara Xu). I assumed since none of the tasks involved mathematical computations, that this learning difference would not interfere with task performance. When I asked Tammy if her learning disability had any impact on her online performance, she indicated "no impact at all." Both informants, however, were not successful on one or more tasks.

***Processing Aural Information*.** Alicia Yolanda and Raeann Yamina both indicated that they had difficulty processing information presented aurally. Because none of the tasks used during the think-aloud session required the use of webpages where information was presented through sound, I anticipated that this type of learning difference would not hinder online performance. However, neither of these two informants indicated that aural processing was their only learning difference. Alicia Yolanda also has difficulty with attention and RaeannYamina has difficulty with reading. These two informants were not successful on one or more tasks.

Anxiety. Xavier and Tara Xu described themselves as being anxious. Tara Xu stated that time limits are an issue for her when registering for classes. She indicated, "You only have a certain amount of time and then the system logs you off." Due to her anxiety about the time limit, she plans her registration ahead of time on paper and then uses the paper copy to do the online registration. The impact of anxiety on task performance that is not timed is unclear. Neither Xavier nor Tara Xu were overtly anxious during their think-aloud sessions. Xavier was not successful on finding an article on the library website. Tara Xu was not successful identifying her final exam time, identifying a textbook, or finding her program homepage.

Informants' comments during performance. Informants with attention and distractibility differences were aware that these differences impacted their online experiences. For instance, Alicia Yolanda stated, "(I sometimes) click around through ANGEL (course management system), forgetting what I'm doing." When she was asked why, she responded, "Because I'm ADD, I get so far out of my way sometimes." Both Adam and Amanda Marie Ruth also admitted to getting distracted online. For example, Amanda Marie Ruth indicated that she often gives herself permission to check her email and Facebook for an hour before attempting her online homework or she gets distracted.

Other informants also reported difficulties that they associated with their learning differences. Raeann Yamina reported that she finds pictures to be important "because I mainly look at pictures because of my dyslexia." She also indicated that she is a very poor speller and uses Google because it corrects her spelling. Vera reported letters "flip" on her making reading difficult when she has been staring at the screen too long.

Informants' perception of impact of learning differences. At the end of the session, informants were asked about how their learning differences impacted their ability to function on the virtual campus. As noted above, Tammy felt her learning differences had no impact on her online performance. Sam and Lauren also indicated that they had no problems in the online environment because of their learning differences. Other informants answered that they did have difficulties that they attributed to their learning differences. Most informants', however, expressed difficulty knowing if the difficulties they were experiencing were due to their learning differences or some other factor. Rebecca Talia indicated she had previously thought about how her disability impacts her ability to use online services. She pointed specifically to the listing of databases on the library site as a task impacted by her learning difference. She qualified her answer by saying**,** "(It) might just be my personality or my learning disability, I don't know."

Summary. During the analysis, I looked for patterns in terms of informant performance on each task as well as commonalities between informants with and without similarly described learning differences. The data collected during this study provides insufficient evidence to state definitively that informants' learning differences contributed to not successful or difficult performance on the virtual campus. While some of the informants believe that their learning differences impact their online performance, most either did not or were unsure.

Emotional Responses

In the initial open coding process, I used codes to indicate instances of emotional responses, interests, and knowledge. Knowledge codes tended to be related to technology and were subsumed under technological savvy (see below). Codes related to

areas of interest were both limited and idiosyncratic and were not helpful to this analysis. Codes related to emotional responses, though limited, did show a pattern that was of interest to this analysis and is therefore described here.

In *Chapter V*, the concept of *Goal Acceptance* became important in my thinking about the process of *Doing Business*. *Goal acceptance* was used to refer to the informants' acceptance of my request to interact with the virtual campus during the think-aloud sessions. In order for students at EFU to interact with the virtual campus, they also have to accept the goal of doing so. Without such goal acceptance, they can simply go to the bookstore rather than purchase books online. They can go to the registrar's office rather than enroll in courses online. Students can also revoke their acceptance of a goal at any time during the interaction with the virtual campus. If they can't find a book in the online library catalog, they can log off and go to the library itself to get help from a librarian.

Codes related to negative emotions (e.g., frustration, confusion, or irritation) were often associated with revoking *Goal Acceptance* during the think-aloud sessions. The informants also described experiences they had with the virtual campus outside the research environment in which they gave up (revoked *goal acceptance*). These descriptions also involved negative emotions. As noted in *Chapter I*, colleges and universities are moving to an online presence, a virtual campus, as a means of attracting technologically savvy students as well as reducing the operational costs of face-to-face services (Kidwell, Mattie, & Sousa, 2000). Care must be taken, however, to ensure that the student experience with the virtual campus is satisfying and positive, or students may

very well revoke their goal acceptance. This has implications for student admissions and retention, as well as success in moving to other operational web-based services.

Strategies for Success

Informants demonstrated and reported behaviors that appeared to help them be successful on the virtual campus. I coded these behaviors as "strategies for success." They are organized below by the suspected purpose of the strategy.

Strategies used to help with attention. When attempting to locate an article on the library page, Amanda Marie Ruth lost focus momentarily but was able to use a self-talking strategy to remind herself of what she was doing. Vera used the same type of self-talk to redirect herself when she got distracted on the bookstore page. Tammy reported, "I de-activate Facebook when I know I have a paper due that week, definitely distracting."

Strategies used to help with reading. Raeann Yamina used the cursor like a finger to point at the text as she read. Tara Xu was noted to use this same strategy but only on the final exam table with which she had trouble. Alicia Yolanda also used the cursor in this way reporting, "I have to. I can't follow it unless I have the mouse here." She also indicated she likes to highlight because "it helps (me) to see." Highlighting was a common strategy reported by the informants both online and when working with hard copy. Although Rachel only highlighted a few times during the think-aloud session, she indicated that she has to highlight text on the screen if she needs to copy it onto paper. She also indicated that she only highlights information presented electronically. She does not highlight paper copy because "I just highlight a whole bunch of stuff and it's not even important." Amanda Marie Ruth, on the other hand, doesn't like highlighting on the

computer screen. She reported, “It doesn’t work (because) I like to read things the way they’re presented.” She does find highlighting helpful when she has a paper copy.

Several informants in this study reported that the most helpful strategy for reading information on the virtual campus was to actually print it on paper and then use strategies such as underlining and highlighting on the resulting hard copy of the text. For instance, Amanda Marie Ruth prints her schedule out prior to registration “because it’s harder for me to read it off the computer.” She also indicated that she would print out the details of a book and take it to the librarian for help finding it. When asked why she wouldn’t simply write down the information, she stated, “(be)cause there’s so much information it’s just safer for me to copy it. Because, like, see this ISBN number? I would mess that up. So just to be safe I always print it out.” Adam also likes having a paper copy so he can highlight and write notes in the margin. Lauren likes the paper copy as well, but she highlights information with the cursor and then copies it from the webpage, pasting it into a Word document. She reported that this strategy helps her avoid wasting paper.

Not all informants like or need a paper copy. If he isn’t rushed for time, Xavier indicated, “I’ll read it and then go to Word, and type, then read, skim, and type a little more.” He also indicated he prefers to read large documents online. He indicated, “I think it’s easier to find (information) online than in the paper manual.”

Strategies used to help with spelling. Informants reported several strategies that they used to accommodate to their spelling problems. Raeann Yamina reported, “Sometimes searching is kind of annoying because of my spelling. Like sometimes when I’m searching on Google or Yahoo it won’t understand what I’m asking it. And I’ll go to a little dictionary on my laptop. I’ll respell it until I get it right and then I’ll go back.”

Raeann Yamina was also observed copying and pasting from a website into an EFU search box. When asked why she did that, she indicated, “I copy and paste everything. I don’t like rewriting...because I have these spelling issues.”

Strategies for memory. Xavier indicated that if he finds something he needs to remember, he writes it down. When asked why he would write rather than print it out, Xavier indicated, “I’d write it on a sticky note. It’s more convenient, I don’t have to plug in my printer or wait for my printer to run it off.”

Summary. The sampling used in this study does not allow me to infer that such strategies are used by all students who have learning differences. Yet it is clear that these informants have learned to use such strategies to be successful. GTM encourages data collection procedures to be modified in response to ongoing analysis. As it became clear that strategy use may be an important factor in online success, I began to ask informants how they learned such strategies. Responses were vague; it appears as if the informants themselves didn’t know how they developed such strategies. Perhaps strategies are translated online from successful off-line strategies such as highlighting. Certainly the similarities of online to offline strategies were noted during the informants’ performance. It may also be that such strategies are translated from one electronic source to another, such as the strategy of cut and paste from word processing. I cannot answer questions regarding how these informants learned these strategies for success, but I can report that such strategies did contribute to successful performance on the virtual campus by these informants.

Self-regulated strategy use has been cited as important for success in the college classroom (Ruban, McCoach, McGuire, & Reis (2003). Trainin and Swanson (2005)

report that college students with learning impairments rely on cognitive learning strategies and help seeking in order to be successful. Studies also suggest that students with learning disabilities demonstrate differences in strategy use in comparison to students without learning disabilities (Reaser, Prevatt, Petscher, & Proctor, 2007; Ruban et al., 2003). Given these differences, it is perhaps no surprise that a number of studies have been published related to the teaching and acquisition of such strategies involving college students with learning disabilities (Allsopp, Minskoff, & Bolt, 2005; Finn, Getzel, & McManus, 2008; Gjajria, Jitendra, Sood & Sacks, 2007; Killu, Weber, & McLaughlin, 2001; Rath & Royer, 2002). No studies were found that look at how such strategies translate into the online environment. This may be a fruitful area for future research.

Help seeking

Given that informants were not successful on a number of tasks during the think-aloud sessions, I felt it important to know what the informants' would do when faced with not successful performance of an online task in their daily life. Informants' who had been not successful on a task were therefore specifically asked what they would do if they were required to complete the task outside the think-aloud session. Help seeking behaviors varied significantly between the informants. While some informants indicated that they tend not to ask for help, other informants indicated they ask for help frequently.

Puustinen and Rouet (2009) categorize help seeking by whether the source of help is human or non-human. The informants in this study had an expressed preference for human help. Several informants indicated that they would never consider using the electronic help features. For example, asked if she would consider an electronic help

option, Alicia Yolanda indicated, “I’d never go to a computer to help me, because I’d just read it over, and read it over, and try to do what it tells me and still not get it.”

Informants indicated that they sought out help from friends, roommates, instructors, and staff members. When the informants used human help, who that human was depended on the task and situation. For some informants, the preference for human helper seemed to be related to a judgment of competence. Alicia Yolanda became frustrated when attempting to identify a course for registration. She indicated, “This is when I go to a friend and ask them to help me.” Later, she had difficulty with the task of finding a journal article. She indicated she would ask a librarian for help. I questioned her as to why in one situation she would ask a friend and in another she would ask a staff member. She indicated that if the problem were perceived to be simple, something that she thought a friend would know, she would question the friend. The database-searching problem was more complicated and she would assume her friends would also have trouble. She would therefore go to the librarian.

Competence didn’t seem to be a consideration for other informants. For instance, Amanda Marie Ruth indicated she wouldn’t do something like database searching on her own, but would go to someone and ask, “Help me, please.” When asked who that someone might be, she responded, “Whoever, anyone. You’re sitting next to me, most likely you’re going to help me do this.”

The traditional dichotomy of human vs. non-human help is blurring with the advent of online help systems such as the 24/7 online chat with a librarian and online tutoring system EFU instituted this past year. Most of the informants indicated that they still prefer talking to a person when they need help. Although Vera indicated that online

services make her life easier, “sometimes I have to go to the library, because I just can’t figure it out. I go find someone to help me.” Andy Mark complimented EFU on its attempts to provide more online help but indicated, “I’d rather go to a person.”

Lauren indicated that she likes to be shown as opposed to told how to do something when she seeks help. She thought that if “showing” could be done electronically, “that would be kind of cool. But only if (the helpers) are as computer literate as I am, (be)cause I am capable on the computer so if it goes slow, then it’s just going to be annoying. But as long as (the helpers) can go at your speed, it wouldn’t be a problem. I think it’d be pretty cool.”

Attempting to be independent was expressed by several informants. Xavier indicated, “I try to do the Internet and do it on my own before I go to ask a person. If I were really stuck and, like, irritated, I would probably just email or call over to the library.” Andy Mark concurred, saying, “I’d probably try it myself and then if I can’t use it (online research tutorial) I’d go next door and ask my roommate or walk down to the library for help.” Raeann Yamina had yet another perspective. She indicated, “If it’s like a college website, I ask people for help. If it’s Google or Yahoo, I just do it myself because I know what’s on there.”

According to Puustinen and Rouet (2009), seeking help with a difficult task has two broad goals. Individuals can seek help with the goal of learning or understanding the principles guiding task performance, or they can seek help simply to complete the task. These authors admit that the distinction is not clear cut. In the process of performing a task, the individual often learns how to complete the task. This distinction is, however, useful in thinking about the help-seeking behaviors of the informants in this study. All of

the requests for help described by the informants related to simple task completion regardless of the task. For instance, Amanda Marie Ruth indicated that she would print out the information on a book and "I'd ask somebody to get it for me."

Technological Savvy and Expectations

The code of 'technology' was used to reflect instances in which informants demonstrated or talked about their experiences with technology in general. I assumed that increased experience or savvy with online environments might impact informant performance on the virtual campus. All informants reported being on the computer from 1 to 5 hours a day. The most commonly reported use of the EFU website was for checking email. Rebecca Talia indicated she checks her email on the average three times a day. She stated, "I do use the email a lot. I guess I was taught to check it every day, because you never know, something could have happened, the professor could have called in sick. Or they email you and say 'don't forget to read this'." Other than email, the informants reported that most of their computer time is not spent on the EFU virtual campus, but on such sites as Facebook. Regardless of the amount of time they spend on the computer, however, all informants expressed confidence about their ability in the online environment.

Evidence of technological savvy was observed throughout the think-aloud sessions. For instance, once on the textbook listing page on the EFU bookstore site, Rachel highlighted the title of the text from the book list page, then went to Google and copied the title in the search box. This led to a list of miscellaneous information so she returned to the booklist page using the breadcrumbs and highlighted the author. She indicated she could also search by ISBN number. Returning to Google via the

breadcrumbs, she pasted the author's name next to the title of the text and clicked search. The textbook came up with links to a number of retail sites including Amazon.

Other informants also indicated that they shop for their textbooks online. Alicia Yolanda indicated she purchases her textbooks from Amazon or some other online source. She talked about "Campus Textbooks.com," a site that compares various sites to see who sells a particular text for the lowest price. Alicia Yolanda also talked about using the EFU bookstore site to select her textbooks, placing those textbooks in the shopping cart so she has a complete list, and then opening a second window in Amazon so she can copy and paste from the shopping cart directly into Amazon. She indicated, "I love shopping online, instead of walking over there (to the bookstore)."

Informants talked about other ways in which they make use of computer technology. Even though Alicia Yolanda indicated she didn't like the computer, she reported that all of her family, including her mother, grandmother, and aunt, use Skype to keep in touch. Xavier puts articles he finds for his classes in "favorites" on his computer, "so you can just click it and you don't have to worry about having it with you or not." Xavier also makes use of tabs so he can have several windows open at one time, stating, "(I'm) good at clicking back and forth. (Tabs) come in handy a lot. Sometimes when I do research or just in general, I'm on Facebook and email and I'm doing homework, I have 6 different tabs up so I can just go back and forth."

Although most informants indicated they rarely use the EFU virtual campus other than email, a few informants reported using the EFU website to stay connected. For example, while on the student life site, Amanda Marie Ruth reported, "I find so much under there. I love this. This is the best part (of the website)." Lauren, a varsity athlete,

indicated she finds the sports page "pretty cool because you get to see what your friends are doing." Rachel also reported she likes to go to the athletic page to see who is on a team. Andy Mark uses the EFU homepage as a way to stay informed about things going on around campus. Amanda Marie Ruth also indicated that many student organizations and even some college offices are using Facebook as well as their site on the virtual campus to stay connected with students.

This technological savvy however was also accompanied by expectations that, when not met, resulted in frustration. Frustration was both reported and observed during the think-aloud sessions with technological "glitches." Rebecca Talia spoke with frustration about ANGEL (the course management system), indicating "sometimes it has glitches to it." Vera began her think-aloud session by indicating she had trouble with the library website. She was asked to describe her specific problems and she indicated that the off-campus login, required when trying to connect to the library site with a wireless computer, wouldn't always come up and/or connect, preventing her from using the online library services from her residence hall room. Andy Mark reported he was frustrated when the 24/7 librarian didn't respond back within 10 minutes.

Familiarity

A factor that seems to mediate between human factors and features of the campus is a factor I have coded "familiarity." Throughout the study I was concerned that if the informants had either extensive or current experience completing a specific task, their performance would not provide useful information about usability/accessibility. For example, because of the timing of stage two of this study, it was anticipated that the task of finding a course prior to registration might be performed easily because informants in

this stage had just recently registered. However, informants in all stages of this study performed this task with ease, so some factor(s) besides currency of experience appeared to influence this performance.

During both the initial interview and during the think-aloud sessions, informants were asked if they had experience with the tasks. As would be expected, those tasks with which informants had experience were performed more successfully than those tasks with which informants had little experience. Direct experience was not necessary for informants to experience a sense of familiarity that was both helpful and not helpful.

One of the features of the virtual campus reported in *Chapter VI* was the structure of the webpage. This structure was perceived by some of the informants as similar to webpages with which they had experience. For example, some informants reported that getting to the team schedule on the athletic site was easy because they had experience with that site. Lauren is an athlete and goes on the site to read news stories about her games. Tammy is a team manager and checks the site frequently. Amanda Marie Ruth uses the athletic page as a social site, checking out the rosters to see who is on the teams. Other informants, however, indicated that they never go to the athletic page and yet all informants except for Alicia Yolanda successfully performed this task. Raeann Yamina, who rarely goes to the athletic site, stated, "Usually athletic websites are pretty good. They don't usually have too much information." Adam also indicated the ease of use might be because athletic websites, citing the Mets and the Giants professional team websites, are all similar.

Familiarity was not always associated with successful performance. Familiar tasks appear to provide cues to the informants as to the format to expect for both *Finding*

Information and *Doing*. When the sense of familiarity results in misinterpreting the cue, not successful performance may result. I believe that for those informants who mistakenly typed search terms into the database selection search box, familiarity with searching (for instance on Google) may have caused them to misinterpret the purpose of this search box.

I did not fully explore this concept of familiarity, but from the informants' performance I hypothesize that features of a webpage that make it seem familiar include a general structure to the page including placement of content and navigational devices (e.g., horizontal menu bars, left column), a common appearance (search boxes), and familiar language. This may be an area that would benefit from further research.

Conclusion

Informants with self-described learning differences that affect their ability to attend demonstrated difficulty with attention during the think-aloud sessions. However, many informants, not just those with self-described problems with reading, had difficulty with reading text-based information on the EFU virtual campus. While differences in auditory processing and mathematical concepts were not anticipated to interfere with task performance, those informants with self-described differences in these two areas still had difficulty. This disconnect between the difficulty I anticipated the informants might experience, based on the informants' self-perceived learning differences, and the difficulties I actually observed needs further exploration.

Several possibilities to explain this observation are proposed. Some instances of not successful performance seem to be related to website usability issues that impact students regardless of individual differences. Indeed, this explanation is likely given

some of the issues discussed in *Chapter VI.* As I attended to my bias throughout this study, however, I became very aware that my understanding of the informants' learning differences was colored by my own experiences with similar students. It may be that this bias led me to make assumptions or anticipate problems that are simply wrong or perhaps simplistic. The type of matching I attempted requires somewhat discrete categories of learning differences. Vana, Vanita, and Vera, however, indicated varied and multiple learning differences. Perhaps this pattern of varied and multiple learning impairments is a more valid description of learning differences than the diagnostic labels which most likely influenced informants' self-descriptions and my understandings (see *Chapter IV*). If categories of learning differences are an inaccurate representation of the lived experiences of these informants, then this type of matching is inappropriate.

In addition, an interaction of individual differences and usability features may influence task performance. For instance, if memorability of a page is less than optimal <u>and</u> a student has a memory difference, the combination may result in not successful performance. If spacing of text is less than optimal <u>and</u> a student has difficulty with reading, again, not successful performance may result.

Successful performance can also be attributed, at least at times, to strategies that helped the informants self-accommodate to their individual needs. Online strategies noted during the think-aloud sessions were limited, but informants reported on a number of additional strategies they use in their daily life. Many of these strategies suggest some technological savvy as well as an understanding of their own learning differences and what works for them.

One specific type of strategy is help seeking. Informants were varied in their willingness to seek out help. Notably, few informants reported the use of, or desire to use, electronic help features. As colleges and universities evolve their virtual campuses, innovative help-seeking services will need to emerge that are useful to, and therefore used by, students. Such services may need to include in-person or combinations of in-person and online help. In addition, it is suspected that most students are concerned with simply completing the tasks they perform on the virtual campus. Implicit educational goals, such as learning how to search for information, may require different strategies than providing readily available online help lines.

Technological savvy in terms of experience with the online environment seems to be helpful for task performance. For instance, the similarity of the horizontal menu bar with similar navigational devices on other webpages may be one reason the horizontal menu bar on the EFU virtual campus is so effective. The virtual campus may be hindered by too close an appearance when that appearance encourages a sense of familiarity that is inaccurate. When attempting to find an article on the library database system, several informants used Google-like behaviors, typing a search term into the wrong search box. Understanding the limits to the technological savvy of this generation, and others, may be important to the design of college and university websites. As such cultures change, web designers of college services must be able to respond to those changes in the technological experiences of the student body, anticipating where misunderstandings may occur.

In concluding *Chapter VI*, I indicated that looking only at features of the virtual campus was insufficient to explain the performance of the informants. As can be seen from the conclusions reached in this Chapter, looking only at factors related to the informants is also insufficient.

Chapter VIII

Summary, Discussion, and Implications

This chapter begins with a summary of the previous chapters and discusses the results of the data analysis in terms of the research questions posed in *Chapters I, VI* and *VII.* The purpose of any study using the grounded theory methodology (GTM) is to propose a theory firmly grounded in the data, which then forms the basis for hypotheses or questions to guide future research. In the discussion section, I propose a model for thinking about accessibility on the virtual campus, and end this chapter by discussing the implications of that model for college administrators, faculty, and staff as well as information technologists, students with learning disabilities, researchers, and disability advocates.

Summary

The intent of this study was to explore the experiences of college students with learning disabilities as they interact with the online services provided by a college, an online environment that I call the virtual campus. In *Chapter I*, the importance of this study was discussed in that two trends currently impacting higher education intersect in this student-web interaction: (1) the number of students with learning disabilities who are enrolling in postsecondary education is increasing; and (2) colleges and universities are increasingly relying on the web for provision of student services. Given the pedagogical, legal, business, and social justice implications of providing usable and accessible online services to students with learning disabilities, I believe this study to be both timely and important.

I justified my choice of an inductive methodology on the basis of the paucity of literature on which to base a deductive study. I chose the GTM as it was my intent to move beyond description to tentatively posit relevant variables and hypotheses to guide further research. A weakness of the GTM is the possibility of forcing the data to fit pre-conceived hypotheses. In order to limit the possibility of *a priori* hypothesizing, the literature review reported in *Chapter II* was limited to several general topics: learning disabilities, college students with learning disabilities, usability, accessibility, and the virtual campus. I returned to the published literature during the analysis phases of this study, using that literature as another form of data.

In *Chapter II*, I further described GTM and in *Chapter III*, I provided a detailed description of the methodology as well as the data collection methods I chose to use. These methods included an initial individual interview to gain an understanding of how the informants perceived their learning disabilities, followed by an individual think-aloud online session in which the informant completed eight tasks on the virtual campus.

In *Chapter IV*, I described the 16 informants, providing both demographic statistics and a description of the informants' self-perceived learning differences. The informants reported self-perceptions that included problems with attention, reading, language, slowness in processing, auditory comprehension, anxiety, memory, and math concepts/calculations. Several of the informants indicated they had two or more learning differences. The themes that emerged from an analysis of their interview data suggest that these informants experience life in a manner similar to that reported in the literature.

In *Chapter V*, I described the analysis method and provided an overview of a task performance framework that emerged from my analysis of the data. Using a constant

comparative method of analysis, I identified four general categories of codes, using those codes to organize the remaining chapters; (1) codes related to the task (*Chapter V*); (2) codes related to the virtual campus (*Chapter VI*), (3) codes related to the informants as individuals, to include their learning differences (*Chapter VII*), and (4) codes related to the informants' performance and actions (*Chapter VII*). In *Chapter V*, I also described the process of *Doing Business*, a process which was identified from the analysis of codes related to the tasks. *Doing Business* is comprised of three sub-processes (*Finding Place, Finding Information, Doing*). These sub-processes were useful in identifying successful and not successful performance, helpful and not helpful features of the virtual campus, and factors related to the informants that impacted their task performance. Successful performance was defined as independent performance that resulted in task completion, whereas not successful performance was defined as performance that required some intervention from me in order for task completion to occur.

In *Chapter VI*, I identified factors related to the features of the virtual campus that were both helpful and not-helpful during task performance. These features fit the following categories; (1) webpage appearance, (2) structure of the webpage, (3) navigational devices, (4) input elements, (5) language, and (6) availability of help services. The features that were identified as helpful, and which conversely were not helpful when absent, can be related to known usability principles.

It was clear from the individual variation of performance, however, that features of the virtual campus were not the only factors that impacted performance. In *Chapter VII*, I identified those factors the informants brought to the interaction that were both helpful and not helpful during task performance. These factors included; (1) the

informants' specific learning difference, (2) emotional responses to the task, (3) strategies for success including help seeking, (4) technological savvy and expectations, and (5) familiarity.

Research Questions. As colleges move toward offering more web-based services, it has become an expectation that students be able to access and use web services such as registration, checking grades and financial accounts, and obtaining library materials online. Given this expectation, it is important that colleges and universities ensure such services are usable and accessible. The overarching research question of this study is: How do college students with learning disabilities experience services provided by a virtual campus?

The informants in this study experienced both successful and not successful performance during the think-aloud sessions. Only four of the 16 informants were successful on all eight tasks. While the GTM does not allow inference to college students with learning disabilities as a population, the fact that so many of the informants in this study found the virtual campus not-usable and/or not-accessible for one or more tasks suggests that further research is warranted. The answer to this question, for these informants, is that the EFU virtual campus is not usable/accessible for at least some tasks.

A sub-question that arose from this initial analysis was: What factors contribute to successful and not successful performance of college students with learning disabilities as they *Do Business* on the virtual campus? I chose the social model of disability as a foundation for this study, focusing on the virtual campus as a potentially disabling environment (Davidson, 2006). In this view, institutions of higher education have a responsibility to ensure that barriers to participation by students with disabilities are

eliminated (Linton, 1998). Given this focus, it was an obvious first step to analyze the impact of features of the virtual campus on task performance, and how those features related to what we already know about accessibility.

One of the primary findings of this study is to provide support for already recognized principles of usability. There are a number of usability principles or guidelines available to guide the web designer. I chose to compare the EFU website to the guidelines proposed by the U.S. Department of Health and Human Services (HHS, 2006). These guidelines are a compilation of 209 principles first recognized by experts in the field through a consensus building process and then published accompanied by supporting empirical evidence where available. Comparing the features of the EFU virtual campus to these usability principles, I found that where such principles were used, informants tended to be successful. Where features of the virtual campus violated such principles, some informants had difficulty or were not successful. As noted in *Chapter II*, principles and guidelines for accessibility related to learning disabilities are not well developed. I was therefore unable to analyze the behavior of the informants related to accessibility guidelines.

It is important to note, however, that not all informants found the presence of such usability principles to be helpful. For instance, several informants with self-described attention problems found attention getting devices distracting and a hindrance to successful task performance. In addition, some informants were able to perform successfully even when the above principles were violated. For instance, several informants easily located the link to the final exam schedule, located in the right column, an inconsistent navigational element.

When usability principles were followed, informants tended to be successful. When they were not followed, informants tended to be unsuccessful. Performance of the informants cannot be wholly explained by looking only at the features of the virtual campus. If that were true, performance would not be as varied as found during this study. Factors related to the informants themselves appeared to also contribute to task performance. Given this observation, identifying how features of the virtual campus contributed to informant performance, was not sufficient by itself to understand the performance of the informants

I therefore asked an additional sub-question: What do college students with learning disabilities bring to their experience with the virtual campus that may contribute to successful performance? Given the focus of this study, it was perhaps too easy to begin that analysis by looking at the impact of the informants' learning differences on their performance. I did so with some reluctance as the shift from a focus on the virtual campus to a focus on the informants had the possibility of reaffirming "labels and their negative connotations" (Goodley, 2004). However, I felt that the informants' performance might point toward specific issues that would guide the development of accessibility guidelines, and that the analysis might be worthwhile from that standpoint.

While the data collected during the think-aloud sessions provide some evidence that the informants experienced problems related to their learning difference, this evidence is insufficient to be convincing. As reported in *Chapter II*, research on learning disabilities from a medical model or deficit viewpoint is common. In such research, the attempt is made to identify the specific issues being experienced, and match them with specific solutions or "fixes." This type of approach is indicative of an underlying

negative attitude about disability, an attitude Hehir (2007) calls “ableism.” This attitude assumes that there is only one “right” way to perform a task. If we make a different assumption, that there are multiple ways to perform, then we can build into the online environment features that allow these students to use their strengths rather than force them to find solutions to address their challenges.

Several of the informants in this study identified themselves with their diagnosis or label. Others described their self-perceived differences in language typically used in learning disability diagnosis (e.g., distractible). Yet few of the informants demonstrated task performance that could clearly be related to their self-described differences. Those informants who indicated they had attention problems did indeed demonstrate distractibility during the think-aloud sessions. Those informants who identified themselves as having other differences, however, displayed a number of behaviors unrelated to their self-descriptions. Conversely, informants often did not demonstrate the learning differences they described. As Ferri (2004) notes, an individual’s first person account or self-description frequently mirrors the medical language that is attached to the individual’s label of learning disability. It is suspected that for these informants, their self-perceptions, couched in terms related to their learning disability diagnosis, were simply too categorical to be useful. The informants did not fit a category, but demonstrated challenges and strengths that fit a continuum of abilities.

This individualized notion of variation in “learning ability” does not lend itself well to research in the medical model tradition. Neither does the social model, however, reflect the importance of individual variations. Recent literature written in the area of Disability Studies in Education (DSE) lends itself to this view of disability at the

intersection of social model and medical model (Gabel & Peters, 2004; Reid and Valle, 2004). The responsibility for student success may not lie only with the colleges and universities, but also with the students as they engage strategies to meet the demands of the online environment. Regardless of the individual variations noted in the informants' performance, it is still within the virtual campus that their performance must be analyzed and instances of not successful performance addressed. A basic tenet of DSE is that disability must be contextualized "within political and social spheres" (Connor, Gabel, Gallagher, & Morton, 2008, p. 448).

As noted in *Chapter VII*, another factor that appeared to impact successful and not successful performance included the informants' use of strategies for success. In attempting to make sense of this human factor, literature in the areas of self-regulation, self-efficacy, motivation, and personal agency were referenced. In some cases this literature addressed these factors at a more macro level than relevant to this study, discussing personal agency, for instance, as it relates to the transition from adolescent to adult roles (Evans, 2007). The literature on self-regulation required careful application as most studies reviewed the effect of self-regulation on learning outcomes rather than task performance, a difference that seems to me intuitively to be important. However, given these caveats, the literature was influential in forming my view of the informant as a personal agent, engaged in a two way interaction with the virtual campus in ways that were sometimes helpful, and other times not helpful, in achieving successful task performance.

It should be noted that the sampling frame of this study involved recruiting college students with documented learning disabilities. This documentation allows the

student to ask for accommodations for their disability. The informants in this study therefore were individuals who acknowledge their learning differences, actively seek out help, and meet regularly with the Disability Officer. It is suspected that the informants were students who have at least some insight and understanding of how their learning differences impact their classroom performance, and how to use strategies to accommodate to those differences. Whether it is this background, or whether they would have developed strategies without this assistance, is not known. However, it was observed that all of the informants had developed one or more strategies that they activated to help them be successful on the virtual campus during the think-aloud sessions.

It was somewhat disappointing that these students didn't use the electronic help features offered through the virtual campus. This would seem to be a useful and readily available strategy for students with learning disabilities. However, it was clear that these students were accustomed to asking for help when they needed it. Although some of the informants indicated they would rather try to work it out on their own, almost all of them indicated if they needed to they would seek out help, preferably from a person as opposed to online. It is also worth noting that the vision of a student sitting in their residence hall room and conducting the business of being a college student in isolation is not a particularly attractive vision when considering the socio-affective goals of college. Any administrative move toward only online help services should be taken with consideration of this social dimension of student life as well as the apparent preference for human help expressed by the informants in this study.

Discussion

Access of students with learning differences to an equitable educational experience has been a long and at times arduous journey for teachers, parents, advocates, and of course, students. Those of us in higher education are still struggling with providing "reasonable accommodations" to these students in the face-to-face classroom (Seale, 2006). As I began this study, I was concerned that students with learning differences were being marginalized once again by the current push within institutions of higher education to provide educational and operational services in an online environment. Yet, the virtual campus provides promise as well as cautions. In this environment, students with learning differences have options not provided to them in a face-to-face environment such as the ability to perform at their own speed, to access assistance around the clock through services provided online, and to search, label and organize information in a way that they can use more easily.

When I began this study, I wanted to know whether or not the virtual campus was usable and accessible to these students. I had no hypothesis, and no literature to guide the development of an hypothesis. I therefore chose an exploratory, inductive study design using a grounded theory methodology. I believe that the purpose of this study fits most closely with the literature being written in disability studies, and in keeping with that literature, I wanted to listen to and understand the perspective of students with learning differences. I wanted to hear about their experiences and from that information attempt to provide future researchers with a framework or model on which to base their work.

From an initial focus on determining in what ways online services were usable and accessible by students with learning disabilities, a perspective that puts the onus of usability and accessibility on the institution of higher education, I have come to a fuller

appreciation of the role of personal agency of these students as they interact with the virtual campus. I am not saying that colleges and universities should not be very concerned about usability and accessibility; they should. It is in their best interest from a business standpoint as well as a legal standpoint to do so. It is also the right thing to do from a social justice standpoint, a value espoused by all institutions of higher education. I am also convinced, however, that universal usability and accessibility is unrealistic if we attend only to the features of the virtual campus.

The informants in this study had difficulty with reading and attending to the information provided on a computer screen, organizing that information in a manner that was useable, and understanding the processes needed to complete the tasks successfully. These challenges may or may not have been related to their learning differences, and in many instances seemed to be challenges that many college students might experience. Regardless of the cause of the challenge, the end result was that these students failed to complete tasks that are expected of the college student.

The failures experienced by these students, however are not the only story I want to tell. I also want to tell about those instances in which these students succeeded using helpful features of the virtual campus and the insightful application of previously learning and self-initiated strategies. If universal usability and accessibility is to be achieved, we must somehow acknowledge the interaction of these personal capabilities with the online environment of the virtual campus. This may mean that we will need to engage students in constructing their own version of the virtual campus that allows them to use their capabilities to bypass any challenges that might be present. This view of web accessibility as being adaptable to the individual user is being discussed as advances in

media make such flexibility possible. The possibility of varying content and presentation has “enormous implications for the concept of accessible technology” (Ellcessor, 2010, p. 304).

Besides allowing users to select options for the presentation of web content, construction of an individualized accessible web interface will also allow users to select and use strategies that help them access and use that content. This will require that users have insight into their own needs and capabilities as well as knowledge of possible strategies that will be available for them to use. My conception of such strategies is similar to the skills and strategies being written about in the literature on information literacy.

There are many definitions of information literacy. The general consensus is that it refers to the ability to effectively and efficiently locate, read, and use information provided through some technological means (Owusu-Ansah, 2003). These same processes (locate, read, use) were observed during the informants’ performance during the think-aloud sessions. Henry (2006) proposes that there are two critical skills for competent information literacy. One is locating information through effective searching, and the other is a “new” type of reading comprehension specific to electronic text. The informants in this study used strategies to help them with both locating information and reading. In both process and skills *Doing Business on the Virtual Campus* would therefore seem to require information literacy.

Of relevance to this discussion on the individualized web interface is how the use of information literacy skills and strategies is learned. Literature on the teaching of searching skills can be found that describes collaborative teaching projects between

librarians and faculty (Freeman & Lynd-Balta, 2010; Stevens and Campbell, 2008; Verhey, 1999; Walton & Archer, 2004); on-demand and multimedia tutorials (Andretta & Cutting, 2003; DiBianco, 2004; Su & Kuo, 2010); specific exercises and assignments (Quarton, 2003); and strategies to increase motivation and positive attitudes toward searching (Martzoukou, 2008). In almost all instances, learning while doing was emphasized. While I did not do an exhaustive literature review in this area, it was striking that this literature focuses almost exclusively on skills and attitudes toward searching. I found no studies that addressed the skill of reading comprehension on the web, a particularly important skill for the population of students with learning disabilities.

Implications of this literature to the type of accessible web interface I envision revolve around how users will learn to use the strategies that are available. Clearly, the research as well as expert advice suggests that such strategies are learned best during actual use (Freeman & Lynd-Balta, 2010; Stevens and Campbell, 2008: Walton & Archer, 2004). Perhaps an intelligent tutoring system that guides users to select appropriate strategies at certain points in an online task would be effective. Another option might be to provide a help icon that can be clicked to elicit such tutoring when the user perceives they are having difficulty. Instruction in information literacy could add strategy use to the content to be covered. In addition, research on reading comprehension on the web is needed so that strategies can be identified that will be effective for any learner who is experiencing difficulty with online reading.

The research questions guiding this study place the phenomenon of interest at the interface of technology and humans. That interface has been described as having varying degrees of usability and accessibility. As noted above, however, current conceptions of

accessibility may be too limiting to address the needs of individuals who have learning disabilities, or perhaps any disability. Although students with learning disabilities come with labels such as dyslexia or attention deficit disorder, such labels do not adequately describe the learning differences these students experience and are therefore not specific enough to provide assistance when developing accessibility guidelines. Nor do such labels acknowledge the capabilities or learned strategies that can be used to compensate for such differences. Rather, it may be that usability and accessibility guidelines, while important, are only a first step.

To be truly accessible, the interface between human and website must be constructed by users so that it meets their needs. While some of this construction is already available, for instance the user can select the size of the font that is displayed on the computer screen, other constructions would be helpful. For example, I conceive of a construction that allows users to request that all links be colored red; that only headings be displayed; or that search boxes use word completion. Menus could be added that would allow users to turn off the timing of any functions or hide any unnecessary graphics. The mouse could be used as an interface for text-to-speech software, hovering over the words that the user wishes to hear. The mouse could also be used to magnify sections of text or to function as a highlighter.

Of course, one of the obvious assumptions in developing such an interface is that users will know how best they interact with the web. While the informants in this study were able to demonstrate strategies that they found effective in helping them be successful, there are other strategies they could have used and didn't. Such a

constructivist interface should then also include tools that help the user make appropriate choices by introducing and perhaps allowing trial use of different features and strategies.

Proposed Hypotheses for Future Research

As noted in *Chapters I* and *II*, the hoped for outcome of a GTM study is a theory or model that guides further research. This theory, comprised of concepts and principles, forms the basis for hypotheses that focus continued research. I propose that thinking about accessibility simply as a matter of webpage features is too limiting. One-size-fits-all thinking is not sufficient when the needs of individuals with disabilities are so varied. Having in place every recommended webpage feature may still leave some individuals with disabilities unable to use a website. At the same time, research on what features should be included on an accessible webpage is simply not adequate, and may never be adequate if based on a categorical way of thinking about disability. Instead, I envision a constructivist process in which the individual is guided through a process of design that results in an individualized interface. I believe such a constructive process can be likened to a sophisticated strategy, one that would be helpful to students on the virtual campus, but has potential also in other environments.

I am neither a web designer nor a software engineer. Designing such a process is beyond my capability. What I can bring to that process based on the results of this study is a sense of the issues that should be considered. I have put these issues together into a series of hypotheses for future research.

1) The performance of college students with learning differences on the virtual campus benefits from those features of the website that follow principles of usability.

The results of this study suggest that usability principles were helpful to the informants during the think-aloud sessions. By themselves, these principles do not ensure accessibility, but they are a good first step.

2) The performance of college students with learning differences on the virtual campus cannot be explained solely by the students' specific difference (impairment, learning disability diagnosis, or educational classification) Accessibility guidelines based on an understanding of such differences therefore will remain inadequate for meeting the goal of universal accessibility.

I did not use the informants' documentation to identify their specific learning difference although several of the informants shared their "diagnosis" with me. Rather, I listened to the informants' self-perceptions of their disabilities and observed the problems they experienced during the think-aloud sessions. I noted that both diagnosis and self-perceptions were incomplete for these informants and may be incomplete for other students with learning differences. The variety of issues these informants demonstrated, some inconsistent with their diagnosis and self-descriptions, make any type of matching of learning difference and performance (and therefore, solution) suspect. Accessibility guidelines may be capable of meeting general needs but will remain insufficient for ensuring accessibility for all individuals.

This does not mean that attempts to develop features on the virtual campus that accommodate to learning differences such as spelling or reading shouldn't be attempted, Rather my point in making this hypothesis is to challenge web developers to think past

categories of disabilities and solutions in order to truly address issues of individual accessibility.

3) The performance of college students with learning differences on the virtual campus benefits from the use of strategies that compensate for variations in learning ability.

It is at this point that I would like to make a break with the language of learning disability or learning difference and refer instead to variations in learning ability. While acknowledging the very real experience of learning differences experienced by these informants, I believe that to reframe their experience in terms of normal variation is perhaps a more consistent view with the social model of disability. It also acknowledges my suspicion that the issues faced by these informants may be faced by college students without the formal label of learning disability.

The informants in this study demonstrated a number of different strategies during the think-aloud sessions that helped them to be successful on the virtual campus. They also reported a number of strategies they used to function online in their daily life. This use of self-regulated strategies has been reported to be a significant factor in classroom success and may therefore be the key to success outside the classroom as well, whether it is on the virtual campus or in the eventual workplace. This area seems to me to be a fruitful area for future research. Certainly questions could be asked about what strategies are effective and in what situations. What types of strategies could be developed for the online environment? How are such strategies learned? What is the best way for such learning to occur?

4) An interface between student and web that can be designed to take advantage of student capabilities and use of strategies will enhance overall success and satisfaction with the virtual campus.

The performance of the informants on the virtual campus would appear to be the end result of an interaction between the features of the website, student capabilities, and the use of strategies for success. This interaction appears to be individually determined as no one informant performed in exactly the same manner as any other informant on the eight tasks. If a human-web interface can be constructed to take advantage of users' individual strengths, performance may be enhanced. In addition, as performance is enhanced, students' emotional response and satisfaction with such services should also improve. Within the virtual campus, such enhancement will result in a more accessible college environment in general in which all students, regardless of their variations in learning ability, can participate in the activities expected of a college student.

Implications

As indicated in the Introduction to this study (*Chapter I*), as more students with learning disabilities enroll in postsecondary education, it is important for colleges and universities to proactively provide services necessary for their success (Cole & Cain, 1996). Rodis, Garrod, and Boscardin (2001) warn administrators, colleges "cannot respond only to crises as they strike. Students with disabilities must be considered as valued members of the educational community" (p. 192). The result of such valuing is an inclusive educational community in which diversity is accepted and all students benefit.

The results of this study have implications for four audiences if an inclusive educational community is the goal: (1) staff, administrators, and faculty in higher

education responsible for providing services to students with variations in learning abilities; (2) information technologists who design web-based services; (3) students with variations in learning abilities; and (4)) disability advocates. The following discussion of implications is therefore divided into sections addressing each audience.

Staff, administrators, and faculty in higher education. EFU has a published usability policy. Whether for this reason or due to diligence on the part of the EFU staff, the EFU virtual campus was noted to follow usability principles on most webpages. Given that the informants in this study were most successful when such principles were followed, it is suggested that other institutions evaluate their need for such a policy and, if not currently in place, consider its implementation. At the very least, college web designers are encouraged to follow usability principles consistently.

One of the more distressing findings of this study is the difficulty informants had in using the library site for finding both books and journal articles. Given that the role of information literacy is important in today's society, improving this performance would seem to be particularly important. Research related to library usage is already represented in the literature (Battleson, Booth, &Weintrop, 2001; Marill, Miller, &Kitendaugh, 2006; Van Den Haak, DeJong, &Schellens, 2003) but research should continue and the findings of such studies should be incorporated into the design of college library sites. Librarians need to advocate as well for inclusion of these findings in off-site database and catalog services.

The presence of helpful and not helpful features on the EFU virtual campus offer some lessons that should be given consideration for further research and implementation. (1) Given that the informants were most successful with those tasks that provided a

guided procedure, it is suggested that staff and administrators responsible for the development of online services pay attention to the way in which task procedures are presented on a webpage. Future research in this area is suggested. (2) In addition, language usage on the EFU virtual campus was a problem for the informants in this study. Usability studies, focusing on language, should be carried out on all pages.

Information technologists. The model of accessibility that I propose above will require innovative application of new technologies. The social justice argument should be sufficient to make such innovation a priority. However, the pay-off in terms of marketability to all students and to improving student satisfaction (and retention) may be sufficient to also justify any additional costs from a business standpoint.

The term authentic is used by many authors (see for example Rodis, Garrod, &Boscardin, 2001) to refer to descriptions written from the perspectives of individuals deeply involved in real-life experiences, as opposed to the descriptions often written by researchers and authors who have had only a superficial experience. An authentic understanding of accessibility is necessary in order to develop solutions that meet real needs. The involvement of students with variations in learning abilities in research, design and implementation of web-based services on the virtual campus must be a conscious decision in order to ensure an inclusive environment.

Students with variations in learning abilities. In the model of web accessibility I propose above, students with variations in learning abilities will be jointly responsible, along with the designers of the virtual campus, in constructing an interface that meets their individual needs. This will require students' commitment to full participation in the activities expected of the student role. This will also require insight into individual needs

and application of learned strategies to accommodate to those needs. Research into strategy learning, strategy use, and such attributes as empowerment, self-regulation and motivation and their application to the use of web-based services will need to be carried out.

Researchers. Besides the hypotheses identified above, there are a number of questions raised by the findings of this study that need further study. I would like to see some attention to the social worlds of students. How do they experience these electronic contexts? Are they socially connecting or socially isolating? While informant comments would suggest that they do not feel socially isolated by the virtual campus, the amount of time these students spend online (reportedly between 1 to 5 hours daily) suggests that social isolation is a real possibility for college students.

The impact of physical context on actual performance may be an important consideration for future research. Does performance in the virtual campus, carried out in an isolated research setting, validly describe the performance of these students when such business is carried out in computer labs, residence halls, and the campus pub?

It is also suspected that the process of exploring the virtual campus may be an important process for some students, particularly for potential students, and could benefit from further study.

Disability advocates. This dissertation wouldn't be complete without a return to the underlying foundation, that of a social construction of disability. My intent in pursuing this study was to ensure that college students with the label of learning disability were engaging in the college experience in a fair and equitable manner in comparison to their non-labeled peers. I continue to feel that this social justice perspective is an

important and worthwhile pursuit. Because the model of accessibility I am proposing above is perhaps not in our very near future, advocates for an inclusive educational environment will need to continue to be vigilant for instances of inequity and discrimination, wherever that occurs.

Appendix A: Recruitment Email

You are being invited to participate in a research study being supervised by Nancy Hollins, professor in the occupational therapy program. Prof. Hollins is looking for students to participate in her study relating to the Utica College online services and their accessibility for students who have learning disabilities. You are being asked to participate because you are a student with an identified learning disability registered with my office. Your participation is entirely voluntary. You will be given $25 for approximately 1 1/2 hours of your time. Prof. Hollins is interested in working with four (4) students at a time of your convenience.

If interested, please email Prof. Hollins at nhollins@utica.edu.

Appendix B: Informed Consent Form

How Do Students With Learning Disabilities Experience the Virtual Environment of College?

Informed Consent

You are invited to participate in this research study investigating the experiences of students with a learning disability as they use online services at Utica College.

- You are eligible to participate in this study because you have identified yourself as an individual with a learning disability and you are enrolled at Utica College.
- You will be one of approximately sixteen (16) students to participate in this study.
- The main purpose of this study is to develop an understanding of how individuals with a learning disability experience the online environment.
- Another purpose is to determine if the online environment at Utica College is usable by individuals with a learning disability.
- This researcher is an instructor at Utica College and a student at Syracuse University.

What you will be asked to do:

- You will be asked several questions regarding your experience with the UC website.
- You will be asked to complete several tasks on the web (such as finding a book from the library homepage, or finding a course in the online course schedule) while at the same time talking about what you are experiencing. Your actions on the computer screen and your face and voice will be recorded.
- It is anticipated that your time commitment will be approximately two hours.
- You will receive $25 for your participation at the end of this online session.

Risks:

- I perceive there are minimal risks associated with your involvement in this research.
- If you feel anxious or upset during your sessions, please inform me immediately and we will stop.
- If at any time after your participation you feel upset, please contact me so you may be referred to a qualified counselor.
- You may also contact Rick Fenner, Chair of the Utica College Institutional Review Board, at 315-792-3144 or Syracuse University's Office of Research Integrity and Protections, at 315-443-3013 if you have any questions or concerns about your rights as a participant.

Potential Benefits

- The benefit to you for participating in this research study are minimal although I hope you will find the experience interesting.
- You may become more self-aware of issues that you are experiencing which will allow you to advocate for yourself with faculty and with the college.
- By volunteering, you will also be adding to our understanding of learning disabilities and perhaps contributing to improved services for college students with learning disabilities.

Guarantee of Confidentiality

- Your session will be held in a private location.
- Your name will not appear on any materials or reports of the research findings (including web-site postings of the results, conference presentations, or professional publications).
- I will keep all materials associated with this study locked in my office.
- I will store your signed consent form separately from your data.
- I will destroy all materials when this study is concluded.

Withdrawal from Participation

- Participation in this study is voluntary.
- Your decision to participate or not to participate will not affect your standing at Utica College in any way.
- If you decide to participate, you are free to withdraw your consent and to discontinue your participation at any time without penalty.
- You will receive payment for participating should you attend any of the online experience.

Questions?

- Please ask if you have any questions about the procedures.
- Please contact me if you have questions later.
- I will answer all questions. However, some questions may not be answered until after you have completed the study to insure that your responses will not be affected by your knowledge of the research.

Participant's Statement

- I am voluntarily making the decision to participate and am at least eighteen years of age.
- My signature certifies that I have read and understand the information included in this letter.
- My signature also certifies that I have had an adequate opportunity to discuss this study with the research investigator and have had all of my questions answered to my satisfaction.
- I understand that by signing this document, I waive no legal rights.
- I also know that I shall receive a copy of this consent form for my records.

  - o I give permission to be audio recorded.
  - o I give permission to be videotaped.

_____
Participant's Printed Name

_____
Participant's Signature

_____
Date

Research Investigator's Statement

In my judgment, the aforementioned participant is voluntarily and knowingly giving informed consent and possesses the legal capacity to do so.

____Nancy Hollins _____
Research Investigator's Printed Name

_____ Research Investigator's Signature

_____
Date

__315-792-3230_____
Research Investigator's Telephone Number

__nhollins@utica.edu_____
Research Investigator's E-mail Address

Appendix C: Sample Transcription of Initial Session

Initial interview, 09/02/09

Question	Response	Code
3:57 You said you're second year...so you're a full sophomore?	Yeah	Demographics
You've been here for a full two years?	Yeah...this is my second year.	Demographics Familiarity
So you started as a freshmen	Yeah	Demographics Familiarity
About how many credits are you carrying each semester?	I think I took 16 and then 17, I'm taking 17 or 18 now.	Student
4:33Wow...that's a pretty heavy load. Do you consider yourself a pretty good student?	Decent...not horrible but not a genius. About average.	Self-perception Student role
You're pushing yourself to take 17 or 18 credits. Is there any reason....	Trying to keep up...I don't want to get behind...have to take an extra semester or two.	Student role
Tell me a little bit about your learning disability? Tell me a little bit about that...when did you find out? What do you have trouble with?	I sometimes don't think I have a learning disability but, um, like I have a hard time focusing in class sometimes, paying attention. Like my mind wanders very easily. Um There's information in class that I think I get and five minutes later I've forgot it or I have no idea what they're talking about, so like with my mind it's usually...it's a little....off.	LD Self-perception Attention Memory Student role Distractibility – wandering mind
5:27You say that sometimes you don't think you have a learning disability, why is that?	I think I know information at times and then I realize that....like, I think I know homework and then I realize when I do it like I don't know it at all.	LD Memory Understanding Self-perception
5:44 So while you're actually listening, its processing but you're not retaining? Is that's what happening	Yeah	LD Memory Understanding
when did you first notice this?	Um Probably middle high school...maybe about 10th grade I really started noticing it.	When it started
Sometimes individuals that have that type of retention problem often have a hyperactivity associated with it. Have you ever had any problems with being able to sit still?	Not really, like I'm usually pretty calm, and relaxed usually.	Self-perception
Did you get services in high school? What did you get?	Yeah. I had the services, usually take them cause I didn't need them. But um like I could take a test in a separate room either with a few	Accommodations Separate location Extra time

	people or alone. ...extra time on tests. I usually didn't need it though..but um some classes I did. And that was it, just extra time and being in a smaller group.	Use of accommodations
Did you find that it's helpful	Sometimes, like in harder classes it is. Like um like last semester for Spanish....it was a lot easier to take a test when I was alone than when I was with other people, but um in math or history , it's a lot easier to take with other people. I find it a little easier. In classes I don't know as much its easier to take alone.	Usefulness of accommodations
Spanish is one of those classes that people have problems with that have difficulty processing different sounds because it's like...well a different language– was that a part of it?	Part of it was that I didn't want to take it. I didn't want to take it..like I just had to. So I didn't really want to learn it I just kind of had to. A lot of that information was ohhh, I really don't need to know it, I just had to take it. I just forgot it, unintentionally. It was pretty hard to learn it.	Student Usefulness of accommodations Motivation Interest
So is this a true statement, when you're really motivated things come a lot easier.	Yeah, like I really have to be like "yeah I really want to do this and then I do a lot better. Lot of times(l) I * really don't want to do this.	Effort Student
	Last time I took a language was in 8th grade and then all through high school I didn't take anything , I got to college and had to take it again. Oh, I really don't want to take Spanish again. I took German in middle school. So I went from German to nothng to Spanish.	Student
What made you change your mind from German?	Well I took German (ike I wanted a challenge and I actually did pretty good, I got about a 85 if I remember correctly. .but then I said, (l), I really don't want to do German again.that was years ago. I just wanted to take the easiest one and see what I can do. My sister took Spanish, my brother took Spanish. My brother was in the same class, we're twins .So we're in the same class we can kind of help each other, so might as well take Spanish together.	Student Family Effort
You mentioned that you think you're thinking about switching your major. Are you finding the same thing that you're not really interested in the ECI stuffanymore?	Yeah, like I used to be. I've talked to my (l) uncles, relatives, friends that are in uh like criminal justice, army, police force, something like that...(l) there's always going to be crime, somewhere something like oh that will be a good fields, there will always be a job. And um I thought the classes were interesting but (l) I'm don't know if I really want to do this like years down the road. Like for right now, I thought the classes were interesting and cool and everything, But (l) not really sure I want to stay with it.	Future plans Interest

You're going into accounting, do you consider yourselfser you pretty good at math.	I'm good with numbers, not (l) with equations .(l) I'm taking Physics now and everyone's like you said you're pretty good at math, I'm good at simple adding , subtracting, dividning ...things like that. When it comes to equations its different, its hard for me. So I'm going to see how Physics goes. I'm taking accounting this semester too to see if I like it.	Self-perception Students Interest
You're good with numbers. Is that what attracts you to accounting?	I think its (l) in the genes. You know my dad, he's an engineer, my uncles an engineer. Like a lot of my family members are in (l) math fields and my dad (l) he's helped me in math all though high school .He's really good in math. Then When it comes to equations, I'm just (l) forget the equations, I mix them up, forget them.. It's easier with numbers, like simple adding, but when it comes to equations like ..not that great...that's what I figured so thought I'd take a couple classes, see if I like it more than EC.	Family Memory Self-perception Interest Student Future plans LD
What are your greatest strengths in the classroom	My memory is good on certain things. (l) if I really want to remember something, I can. But like my memory is really bad. If I see someone, I don't remember their name (l) two minutes later. If someone is really cool and interesting, then I can (l) remember names even if I see them like years down the road. My memory can be good but its bad at times too. So um Kind of like math equations...like with math equations, I can't remember them at all. I can remember dates pretty well...like I remember birthdays just randomly. (l) and um My memory is kind of weird like that I can remember things that mean nothng and then some things that do matter, (l)its like I don't really want to know it so I don't really try So its both good and bad	Memory Interest Student Self-perception Effort LD
Sounds like if it's interesting, exciting, motivating...you're doing just fine.	That's usually the problem...sometimes I'm not really motivated to want to do something.	Interest
How has your disability affected you at college outside of the classroom.In other ways has it affected you?	I don't think so. Its more like.....I don't think its really affected me. It's helped sometimes having time on tests.and everything ..... I usually don't really (l) notice my disability until (l) after I should have done something about it...like after taking a test. I realize, I forgot that...oh, probably should have done something, thought I knew it but really didn't. (l) I guess I could use it (help) more and since its there I should use it, but (l) sometimes I don't think I need it but I do	Outside the classroom Accommodations Usefulness of accommodations Self-perception LD
My background is that I'm a	Definitely. Happens for different things. Like it	Self-perception

therapist as well and as a therapist I might say that maybe your insight in terms of what you know and what know is not quite on – is that a true statement. Does it happen for certain things? 13:20	can happen with (l) remembering someone's name or remembering stuff about homework. But (l) it can be the complete opposite, a couple days later I can remember the exact same thing. So its like My mind wanders and remembers different things.	memory LD
Sounds like you can't really anticipate when you're going to have trouble	I can't really can't keep it steady...so that's why its difficult	LD
You can't really figure out any strategies if its not always the same thing	Yeah	Strategies
Have you had anyone that's helped you figure things out any strategiesor anything that helps 13:38	Not really. .I haven't really tried..you know, .no one has every really tried. They're just , Oh...just take extra time, and I'm like OK	Strategies
Are you in a sport?	No, I used to play hockey and then I got a disease in my knee.	description
Did you ever find your mind wandering in hockey? Was that eever a problem	No not really, like I loved hockey, I played it for 9 years... it was my life. I played baseball, then I quit baseball for roller hockey and then I quit roller hockey for ice hockey. It was (l) my whole life. I was playing baseball at the same time I played roller hockey. Right before high school, I was playing a championship game and I got a disease in my knee and couldn't play anymore.....and um since then like basically my life changed....like My whole life was hockey and then I couldn't play sports anymore. Like It still hurts,..the bones rub up against each other. I was told it was a disease and I was talking with one of my friends, he's a marine biologist in the Army, (l) its not a real disease, its called AusterSchlader....and I go OK. it hurts walking upstairs sometimes too, it's been like 5 years. In the knee, sometimes down to the shin but all the bones right here just rub together.	Description
So that limits some of the other things you do socially? You can't go out an throw a football	Well, I can...like I usually push myself. Some of my friends play soccer, and I go out an play soccer and then I get back to the my room like and my leg feels dead.., I can't even walk on it sometimes..I love sports .I always push myself with my knee	Description
15:38How about social things. You said you have trouble with names, any other	Yeah usually..its (l) Oh, hi Bob...oh Jeff.	Description Memory
How about social things. You can't remember names. Any other ways in which your disability has affected your social life, interests.	Not really...usually people don't think I have a learning disability, oh he's just a normal kid. Usually I just tell people I have a bad memory..thats my excuse for everything.	Description Memory Self-perception Social

You just said something that's a trigger for me... people think you are normal .what do you think about having a learning disability? Is it something you're embarrassed about or is it something that just is.	Like at times, I think like oh, like people think that oh, he's got a learning disability, he's not the same. Sometimes I think people think that. But a lot of my friends...oh, you've got a learning disability ...its not a big deal, its not like youre crazy or something, sometimes I think its' a little embarrassing but I know its really not. But at times I think, I don't want to leave the room. I don't want to be the one like leaving the room cause he's got a learning disability and others say "I thought he was OK I don't want to be the one leaving. I don't want others to say..oh, I thought he was OK. But that's a big reason I never took extra time on test..it was like the teachers would call me out, "you want to take extra time", oh no...thanks	Self-perception Social Use of accommodations
We need to train our professors to be a little better.	No,..They're a lot better here. Like in high school the teacher would say "Oh yeah, you're the kid with the learning disability. Do you want to go take this test in the library?" Well thank you but No.....I'll just take it here. I'm fine..	Social Use of accommodations
Did that ever backfire on you?	MMMM...Not really, at times it was I (l) wanted to (take the test separately) but then I was like ..I'll stay here and then could barely get through it I'd be really rushed at the end and they'd say, you can take it tomorrow. It's like being In front of other people admitting to it, that I have a learning disability...and I really didn't want to do it	Accommodations Use of accommodations Social
Do you still feel that way.	Not as much, because like kids here they're (l) not in high school, in high school they're a lot younger and not as mature. High school kids and college, they're like....Kids,here , they always get tutors here. In high school no one had a tutor. "oh, you have a tutor". But here, you hear other students say "I really need a tutor." And its here and its free. Lot of kids get tutors...its a different way. I'm not really embarrassed anymore since I've been here.	Social
My interest is in the internet and how that might be affected. Have you ever noticed any problems in particular.	Not really. Usually its like researching on the internet... It's like the big thing is google it, see what comes up...everyone did, even my high school teachers they were like"just Google is" they didn't really give, the library did, you any (guidance) but then I came here and you can't use it, and I'm like, great, I've been using google for 5 years. So it's a little different. I did hear about the online tutoring and the online research.andeverything..I haven't really tried it	do online Use of online services
Is it interesting to you?	I've not really gotten any tutoring. I had one tutor and she wasn't helpful and then I had a tutor for Spanish and that person never called me. So I'll guess I'll do it on my own or have someone else help me. Like my roommates..I'm	Accommodations Usefulness of accommodations Social

	in a suite with five other people. – all different majors. I love that we're all different, good at things. If I need help with writing, one of my roommates he's is good with that. One's good with math, and he helps with that. They're all different majors. Ones' a bio, ones OT/PT. I can go to any of them. Ones amazing in math, you can tell him 10 random numbers and he can add them like that In a second. (l) We were playing cards and throwing the cards down and Adam, he was adding them like that. He's like my math go-to. I don't really think I need a tutor because I have all of them too. I don't want to rely on them when they're like "I've got homework...." OK, well ...* you said you'd help me.	
Does the idea of online tutoring, is it even attractive to you	It wouldn't be the same as being face to face....just being on line...not that they cant help them but it just isn't the same way. It's like texting...you don't know the person's reaction you just read what they say and you can read it a different way. It's the same way with tutoring...its like easier like face to face you can say more, you can react more to them like being a person.	Use of online services Social Communication
What about online courses	I've thought about it, but since I'm here why not walk to Hubbard, to Gordon to take the classes.	Online courses Social
Same thing in terms of the social interaction	It would be a little better. Being on line, sitting at the computer and like typing all sorts of stuff like doing oh, here's my homework. I would rather like actually know my professors. I usually go out of my way to meet my teachers.I did that all through high school .I call my teachers up for coffee in high school and we'd talk then. It was easier knowing the teachers. Actually talk to them after class or doing office hours instead of being online and talking to them.	Online courses Social Student Communication
I can see a connection when you're excited, interested and motivated you can retain things better. I'm also hearing you say that you like that social contact. Could that be a difference inbeing attracted to online tutoring, online classes that social contact gives you that excitements,	It's probably a lot easier getting a tutor to be face to face, for the tutor it might be easier to (l) be at the computer, it might be easier for the tutor to be on the computer and help you.. But I'd rather do it face to face, sit down with them and say I need help with that and point to it instead of being on the computer and typing I need help with #7 and I don't get this part, and they say that part and it doesn't really help. I'd rather be sitting down face to face and talking to them	Accommodations Use of online services Social Communication

Appendix D: Storyboard

Name: __Andy Mark_____ Task: _____Looking at Homepage _____

Mouse movements/clicks	Screens	Time	Transcription	Observation	Codes
ON homepage already, mouse quiet	Homepage – lots of pictures, UC Banner fills ¼ of page, announcements, color, different size font	1.3	*...looking first at the college homepage, what pops into your head when you look at it?* I sometimes go to that too to check out what's going on around campus. And um, I just read what they say here. Like homecoming weekend, ...I really don't think of anything. I just look at it and like, "ok".	Initially quiet (while reading)	• Know what's going on • Read screen • What it looks like • Habit • Information gathering • Mouse quiet • scanning
Minimal mouse – scrolling while talking			*do you scan it every time you get to it or sometimes just go "poof" right through it?* Sometimes I look at it. Sometimes I look at upcoming events and like, Oh... what's happening here, like what sports are playing or whatever. But ummm, usually that's about it except to check my email and everything.		• Know what's going on • Use of online services • Do online • Mouse quiet • Habit • scanning
Used mouse to point to colors in banner at top of page		X	*Is there a piece of this website, this homepage that attracts your attention.Do you like the pictures...does that help you.Do you like that some of these things are larger, or different colors.* I think the pictures are pretty cool...at least they're the first thing I look at when I look at it. Umm, I guess the colors do bring your attention, like to the orange coming out of the blue. Um...not really that much to look at though. Yeah, I think the pictures are.....		• what it looks like • attention getting • mouse pointer

Name: __Andy Mark_____ Task: ____finding the accounting homepage_ _____

Mouse movements/clicks	Screens	Time	Transcription	Observation	Codes
Moved mouse to google search box	Homepage –	X	*Can you go to the accounting site just to get information about it?*		• Mouse deliberate • Search box
Typed in "accounting"	Homepage		*Remember that you're talking about what you're doing.* I'm typing in accounting into the search engine of the website.		• Search box
Moved mouse down to 5th link and clicked – mouse movement was direct, deliberate, no hesitation at any site At my question, used back button to return to search screen while talked	Google Search screen – list of "Accounting" links, font size and bold used for link title, text smaller and unbolded, url address at end, UC link was 5th one down		*Now why did you do that? Why didn't you go to like some of the links?* I've just found this easier. Like when I was switching majors I was, instead of looking for it everytime I just typed in Economic Crime Investigation program or Accounting program or like the requirements for it....I just found it easiest to go to the search engine and find it here. Sometimes I'm looking for a teacher too and that's why I	Was reading the url addresses of each of the links methodically from top to bottom	• Searching • Easier • Do online • Future interests • Information gathering • Mouse deliberate • Navigation • Format – lists, text, font
			If you're searching for a teacher? Yeah like I go to the math department or the accounting department and find a teacher there.		• Do online
Used mouse to underline url of Southwest University , mouse movements smooth and deliberate	I pointed to the 5th link -		*Why'd you go to that one? Why not the one at the top?* Well that was a different school, Southwest University. Edu. So I went to Utica.edu slash....		• Mouse – pointer • Active doing • Decision making
went back to UC link and clicked on it, deliberate mouse movements			*So you kind of scanned for the address then.* Yeah		• Searching • Mouse deliberate

Lots of scrolling using the mouse roll button - up and down on left side of screen, fast, not deliberate but rather in a searching manner,	Business and Economoics home page – accounting section - lots of text, no pictures		*Accounting page...now you're interested in changing to this major so what/where would you go on this page.* I've actually never been to this page. Ummm...Not really sure. Probably like what you can do with an accounting degree and what kind of field you can go into.	Mouse scrolling was too fast for reading – would scroll then stop momentarily (to read) then scroll again,	• Up down • Scanning • Mouse scroll • Format – text • Information gathering • Read screen
Continued to scroll using mouse button quickly up and down			*Do they have that kind of information there?*mmmmmmm....You could probably find it. Umm...Like my uncle is a CPA um, I think these are all types of certifications you can be if you have an accounting degree.		• Up-down • Mouse scroll • Searching • Feelings online • Family • Future plans • assumptions
Used mouse to point to information he was talking about in center of screen, used mouse scroll button to scroll to indicate entire paragraph			*anything else there that is interesting.* Like what you can ...um, like um, look at career paths in accounting like tax planning and different ones, like ECI (economic crime investigation). That was one I was interested in for ECI		• Mouse – pointer • Mouse – scroll • Information gathering • Future plans
Moved mouse to right and moved it around, very little scrolling but random up/down movements in top right area of screen			*What do you like about this site or what do you not like about this site? Is it useful to you?* Mmmm....um, let's see, um, ...um, I don't know, um.... I'm not really sure, um, ..you could probably find information by clicking on course description and schedule, and like the requirements for accounting, and CPA ...probably different.		• Left-right • Up-down • Mouse – random • Information gathering • Searching • Feelings online • assumptions

Minimal movement of mouse in top right area – still in up down direction			*Have you looked at that? Are you thinking about CPA?* Not really sure. My neighbor is a CPA. And I was talking to her and she was giving me an idea of like what she does...I don't want to go into what she does...like she's a personal tax attorney, not an attorney, but a personal accountant for close friends, relatives and all that –like my mom, she's my mom's accountant and um, she like deals with taxes and income and all that. And I was like, mmmmm, that's interesting but not really what I want to do		• mouse –quiet • future plans • social • family • interests
Accounting link was in top right area where mouse was already, moved to it and clicked deliberately with no searching			*Click on just plain accounting now.*		• Mouse = deliberate
Moved mouse from mid left position to top right and then to mid right while describing what he was looking at	Accounting homepage – lots of text, isn't contained on screen – have to scroll down to get whole text		(quiet) It goes into a description of the accounting major and looking at fields and what you can go into with an accounting degree.		• Mouse – pointing? Random? • Format – texts • Read screen • Information gathering • Future plans
Used mouse scroll button to scroll down while describing what he was seeing and then to scroll back up			It gives course requirements, and how many credits.		• Mouse – scroll • Up down • Gathering information

Appendix E: Flowchart Record

Key

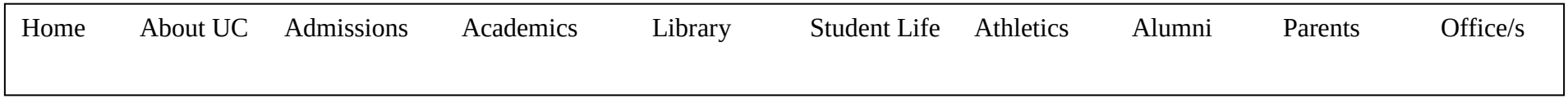
Deliberate movement

Unsure, trial and error movement

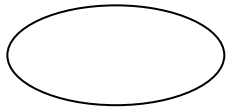
System determines movement

Webpage

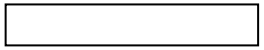
Horizontal menu bar (HMB)



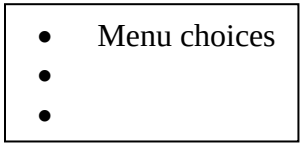
Link



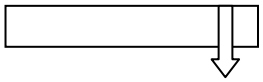
Type in box



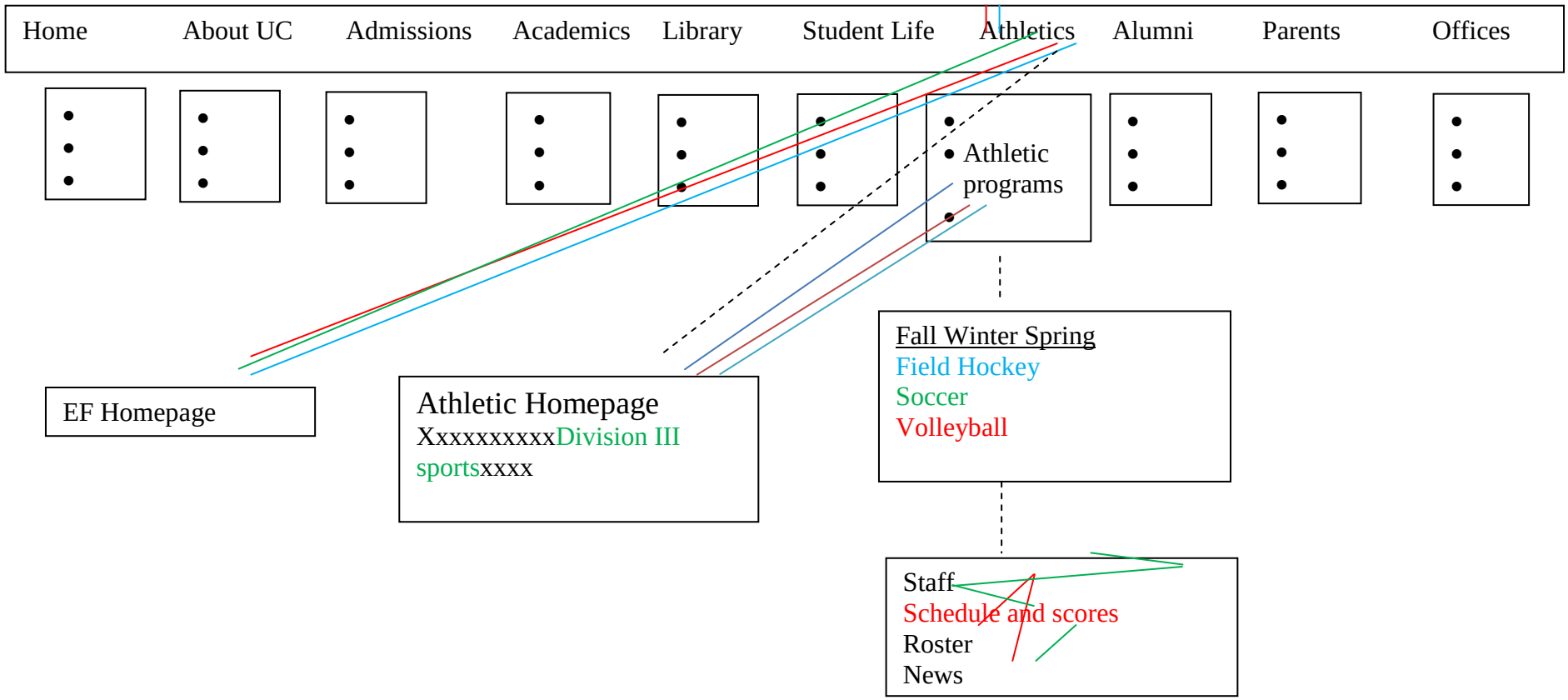
Drop down menu



Rolling menu



Task: Locating an Athletic Team Schedule



Reference List

Allsopp, S.H., Minskoff, E.H., & Bolt, L. (2005). Individualized course-specific strategy instruction for college students with learning disabilities and ADHD: Lessons learned from a model demonstration project. *Learning Disabilities Research & Practice, 20,* 103-118. doi: 10.1111/j.1540-5826.2005.00126.x

Americans with Disabilities Act of 1990, 42 U.S.C., §§ 12101 *et seq*.

Andretta, S., & Cutting, A. (2003). Information literacy: A plug-and-play approach. *International Journal of Libraries & Information Services, 53*(3), 202-209. doi:10.1515/LIBR.2003.202

Architectural and Transportation Barriers Compliance Board. (2000, March 31). Electronic and Information Technology Accessibility Proposed Standards (Docket No. 2000-01).
Retrieved from http://www.access-board.gov/sec508/nprm.htm

Barga, N. (1996). Students with learning disabilities in education: Managing a disability. *Journal of Learning Disabilities, 29,* 413-421. doi:10.1177/002221949602900409

Battleson, B., Booth, A., &Weintrop, J. (2001). Usability testing of an academic library Web site: A case study. *The Journal of Academic Librarianship, 27*(3), 188-198.

Bibeau, S. (2001). Social presence, isolation, and connectedness in online teaching and learning: From the literature to real life. *Journal of Instruction Delivery Systems, 15*(3), 35-39. Retrieved from http://www.salt.org/jidstoc.asp

Bigus, O. (1996). Becoming "alcoholic:" A study of social transformation. In B.G. Glaser, (Ed.) *Gerund Grounded Theory: The Basic Social Process Dissertation.* Mill Valley, CA: Sociology Press.

Boyd, R.K., & Moulton, B. (2004). Universal design for online education: Access for all. In D. Monolescu, C.C. Schifter, & L. Greenwood (Eds.), *The distance education evolution: Issues and case studies* (pp.67-115). Hershey PA: Information Science Publishing.

Brault, M.W. (2008). *U.S. Census Bureau Americans with Disabilities: 2005.* Retrieved from http://www.census.gov/prod/2008pubs/p70-117.pdf

Bricout, J.C. (2001). Making computer-mediated education responsive to the accommodation needs of students with disabilities. *Journal of Social Work Education, 37*, 267-281.

Bryant, A., & Charmaz, K. (2007a). Grounded theory in historical perspective: An epistemological account. In A. Bryant & K. Charmaz (Eds.), *The SAGE handbook of grounded theory*. Los Angeles: Sage.

Bryant, A., & Charmaz, K. (2007b). Introduction. In A. Bryant & K. Charmaz (Eds.), *The SAGE handbook of grounded theory*. Los Angeles: Sage.

Burgstahler, S.E. (2000). Access to Internet-based instruction for people with disabilities. In L.A. Petrides (Ed.), *Case studies on information technology in higher education* (pp. 76-88). Hershey, PA: Idea Group.

Burgstahler, S.E., Corrigan, B., & McCarter, J. (2004). Making distance learning courses accessible to students and instructors with disabilities: A case study. *Internet and Higher Education, 7*, 233-246. doi: 10.1016/j.iheduc.2004.06.004

Calkins, K. (1993). Shouldering the burden. In B. Glaser (Ed.), *Examples of grounded theory: A reader*. Mill Valley, CA: Sociology Press.

Cardenas, J. (1997, April 7). Letter to Dr. James Rosser, President, California State University, Los Angeles. Retrieved from http://people.rit.edu/easi/law/csula.htm

Clarke, A.E. (2005). *Situational analysis: Grounded theory after the postmodern turn*. Thousand Oaks, CA: Sage.

Cole, B.S., & Cain, M.W. (1996). Social work students with disabilities: A proactive approach to accommodation. *Journal of Social Work Education, 32*, 339-349.

Connor, D.J. (2009). Creating cartoons as representation: Visual narratives of college students with learning disabilities. *Educational Media International, 46*, 185-205. doi:10.1080/09523980903135319

Connor, D.J., Gabel, S.L., Gallagher, D.J., & Morton, M. (2008). Disability studies and inclusive education: Implications for theory, research, and practice. *International Journal of Inclusive Education, 12*, 441-457. doi: 10.1080/13603110802377482

Crow, K.L. (2008). Four types of disabilities: Their impact on online learning. *TechTrends, 52*(1), 51-55. http://www.springer.com/education+%26 +language/learning+%26+instruction/journal/11528

Curl, A., & Bowers, D.D. (2009). A longitudinal study of website accessibility: Have social work education websites become more accessible*? Journal of Technology in Human Services, 27*(2), 93-105. doi:10.1080/15228830902749229

DaDeppo, L.M. (2009). Integration factors related to the academic success and intent to persist of college students with learning disabilities. *Learning Disabilities Research & Practice, 24*(3), 122-131. doi: 10.1111/j.1540-5826.2009.00286.x

Danforth, S. (1999). Pragmatism and the scientific validation of professional practices in American special education. *Disability & Society, 14*, 733-751. doi:10.1080/09687599925867

Davidson, M. (2006). Universal design: The work of disability in an age of globalization. In L.J. Davis (Ed.), *The disability studies reader* (2nd ed., pp.117-130). New York: Routledge, Taylor & Francis Group.

Denhart, H. (2008). Deconstructing barriers: Perceptions of students labeled with learning disabilities in higher education. *Journal of Learning Disabilities, 41*, 483-497. doi:10.1177/0022219408321151

DePoy, E., & Gitlin, L.N. (2005). *Introduction to research: Understanding and applying multiple strategies.* St. Louis: Elsevier Mosby.

Dey, I. (2007). Grounding categories. In A. Bryant & K. Charmaz (Eds.), *The SAGE handbook of grounded theory* (pp.167-190). Los Angeles: Sage.

DiBianco, P. (2004). Teaching information literacy skills in the age of search, click, copy, and paste. *Information Searcher, 14*(4), 1–32. http://infosearcher.typepad.com/infosearcher/articles/info_literacy2.pdf

Ellcessor, E. (2010). Bridging disability divides: A critical history of web content accessibility through 2001. *Information, Communication & Society, 13*, 289-308. doi: 10.1080/13691180903456546

Evans, K. (2007). Concepts of bounded agency in education, work, and the personal lives of young adults. *International Journal of Psychology, 42*(2), 83-93. doi:10.1080/00207590600991237

Ferri, B.A. (2004). Interrupting the discourse: A response to Reid and Valle. *Journal of Learning Disabilities, 37*, 509-515. doi:10.1177/00222194040370060501

Field, S., Sarver, M., & Shaw, S. (2003). The importance of self-determination in postsecondary settings. *Remedial and Special Education, 24*, 339-349.

Fichten, C. S., Ferraro, V., Asuncion, J. V., Chwojka, C., Barile, M., Nguyen, M. N. & Wolforth, J. (2009). Disabilities and e-learning problems and solutions: An exploratory study. *Educational Technology & Society, 12* (4), 241–256. Retrieved from http://www.ifets.info/journals/12_4/21.pdf

Finn, D., Getzel, E.E., & McManus, S. (2008). Adapting the self-determined learning model for instruction of college students with disabilities. *Career Development for Exceptional Individuals, 31*(2), 85-93. doi:10.1177/0885728808318327

Fletcher, J.M., Morris, R.D., & Lyon, G.R. (2003). Classification and definition of learning disabilities: An integrative perspective. In H.L. Swanson, K.R. Harris, & S. Graham (Eds.), *Handbook of learning disabilities* (pp. 30-56). New York: The Guilford Press.

Flowers, C., Bray, M., & Algozzine, R.F. (2001). Content accessibility of community college web sites. *Community College Journal of Research and Practice, 25*, 475-485. doi:10.1080/10668920152407874

Foley, A. (2003). Distance, disability and the commodification of education: Web accessibility and the construction of knowledge. *Current Issues in Comparative Education, 6*, 27-39.

Foley, A. (2007). Distancing education: Understanding of disability and the provision of access to content. *International Journal of Instructional Media, 34*, 17-27.

Freeman, E., & Lynd-Balta, E. (2010). Developing information literacy skills early in an undergraduate curriculum. *College Teaching, 58*, 109-115. doi: 10.1080/87567550903521272

Friedmen, M.G., & Bryen, D.N. (2007). Web accessibility design recommendations for people with cognitive disabilities. *Technology and Disability, 19*, 205–212.

Gabel, S., & Peters, S. (2004). Presage of a paradigm shift? Beyond the social model of disability toward resistance theories of disability. *Disability & Society, 19*, 585-599. doi:10.1080/0968759042000252515

Gjajria, M., Jitendra, A.K., Sood, S., & Sacks, G. (2007). Improving comprehension of expository text in students with LD: A research synthesis. *Journal of Learning Disabilities, 40*, 210-225. doi:10.1177/00222194070400030301

Glaser, B.G. (1978). *Theoretical sensitivity: Advances in the methodology of grounded theory*. Mill Valley, CA: Sociology Press.

Glaser, B.G. (1992). *Basics of grounded theory analysis: Emergence vs. forcing*. Mill Valley, CA: Sociology Press.

Glaser, B.G., & Strauss, A.L. (1965). *Awareness of dying.* Chicago: Aldine Publishing Co.

Glaser, B.G., & Strauss, A.L. (1967). *The discovery of grounded theory: Strategies for qualitative research.* Chicago: Aldine Publishing Co.

Goodley, D. (2004). The place of people with 'learning difficulties' in disability studies and research: Introduction to this special issue. *British Journal of Learning Disabilities, 32*, 49-51.

Graham, L.J., & Grieshaber, S. (2008). Reading dis/ability: Interrogating paradigms in a prism of power. *Disability & Society, 23*, 557-570. doi:10.1080/09687590802328386

Gregg, N., Hoy, C., Flaherty, D.A., Norris, P., Codeman, C., Davis, M., & Jordan, M. (2005). Decoding and spelling accommodations for postsecondary students with dyslexia: It's more than processing speed. *Learning Disabilities: A Contemporary Journal, 3*(2), 1-17.

Guyer, B.P., & Sabatino, D. (1989). The effectiveness of a multisensory alphabetic phonetic approach with college students who are learning disabled. *Journal of Learning Disabilities, 22*, 430-434. doi:10.1177/002221948902200707

Hadley, W.M. (2006). L.D. students' access to higher education: Self-advocacy and support. *Journal of Developmental Education, 20*(2), 10-16.

Hallahan, D.P., & Mock, D.R. (2003). A brief history of the field of learning disabilities. In H.L.Swanson, K.R. Harris, & S.Graham (Eds.), *Handbook of learning disabilities* (pp.16-29). New York: The Guilford Press.

Hehir, T. (2007). Confronting ableism. *Educational Leadership*, *64*(5), 9-14. http://www.ascd.org/publications/educational-leadership.aspx

Heiman, T., & Kariv, D. (2004). Manifestations of learning disabilities in university students: Implications for coping and adjustment. *Education, 125*, 313-324.

Heiman, T., & Precel, K. (2003). Students with learning disabilities in higher education: Academic strategies profile. *Journal of Learning Disabilities, 36*, 248-258. doi:10.1177/002221940303600304

Henderson, C. (2001). *College freshmen with disabilities: A biennial statistical profile.* Washington, D.C.: American Council on Education, HEATH Resource Center. Retrieved from http://eric.ed.gov/

Henry, L.A. (2006). SEARCHing for an answer: The critical role of new literacies while reading on the Internet. *The Reading Teacher, 59*, 614-627. doi: 10.1598/RT.59.7.1

Henry, S.L. (2003). *Constructing accessible websites*. San Francisco: Apress.

Heyer, K. (2007). A disability lens on sociolegal research: Reading rights of inclusion from a disability studies perspective. *Law & Social Inquiry, 32*, 261–293. doi: 10.1111/j.1747-4469.2007.00058.x

Hood, J.C. (2007). Orthodoxy vs. power: The defining traits of grounded theory. In A. Bryant & K. Charmaz (Eds.), The *SAGE handbook of grounded theory* (pp.151-164). Los Angeles: SAGE.

Huprich, J., & Green, R. (2006). Assessing the library homepages of COPLAC institutions for Section 508 accessibility errors: Who's accessible, who's not, and how the online WebXACT Assessment Tool can help. *Journal of Access Services, 4*(1/2), 59-74. doi:10.1300/J204v04n01_04

Humberstone, V. (2002). The experiences of people with schizophrenia living in supported accommodation: A qualitative study using grounded theory methodology. *Australian and New Zealand Journal of Psychiatry, 36*, 367-372. doi:10.1046/j.1440-1614.2002.01034

IBM Human Ability and Accessibility Center. (2011). *Web checklist*. Retrieved from http://www-03.ibm.com/able/guidelines/web/accessweb.html

Illinois Department of Human Services. (2012). *Illilnois Information Technology Accessibility Act Standards.* Retrieved from http://www.dhs.state.il.us/page.aspx?item=32765

Individuals with Disabilities Education Act, reauthorized in 1997, 20 U.S.C. §§ 1400 *et seq.*

Jorgenson, S., Fichten, C.S., Havel, A., Lamb, D., Crystal, J., & Barile, M. (2005). Academic performance of college students with and without disabilities: An archival study. *Canadian Journal of Counseling, 39*(2), 101-117.

Kavale, K.A., & Forness, S.R. (2003). Learning disability as a discipline. In H.L. Swanson, K.R. Harris, & S. Graham (Eds.), *Handbook of learning disabilities (pp.76-93).* New York: The Guilford Press.

Kelle, U. (2007). The development of categories: Different approaches in grounded theory. In A. Bryant & K. Charmaz (Eds.), *The SAGE handbook of grounded theory* (pp.191-213). Los Angeles: Sage.

Kelly, B., Sloan, D., Brown, S., Seale, J., Petrie, H., Lauke, P., & Ball, S. (2008, May 7). Accessibility 2.0: People, policies and processes. *Proceedings of the 2007 International Cross-Disciplinary Conference on Web Accessibility (W4A).* doi: 10.1145/1243441.1243471

Kidwell, J., Mattie, J., & Sousa, M. (2000). Prepare your campus for e-business: Tips for crafting a successful strategy. *Educause Quarterly, 2*, 20-28.

Killu, K., Weber, K.P., & McLaughlin, T. F. (2001). An evaluation of repeated readings across various counting periods of see to think, think to say, and think to write channels with a university student with learning disabilities. *Journal of Precision Teaching and Celeration, 17*(2), 39-57.

LaGow, R.L. (1976). *The development of a grounded theory for the design of instruction in adult education agencies* .(Doctoral Dissertation). Lincoln, NE:University of Nebraska Press.

Lane, H. (1995). Constructions of deafness. *Disability and Society, 10*, 171-189. doi:10.1080/09687599550023633

Lempert, L.B. (2007). Asking questions of the data: Memo writing in the grounded theory tradition. In A. Bryant & K. Charmaz (Eds.), The *SAGE handbook of grounded theory* (pp. 245-264). Los Angeles: SAGE.

Li, Y., & Belkin, N.J. (2008). A faceted approach to conceptualizing tasks in information seeking. *Information Processing & Management, 44*, 1822-1837. doi:10.1016/j.ipm.2008.07.005

Linton, S. (1998). *Claiming disability: Knowledge and identity*. New York: New York University Press.

Marill, J.L., Miller, N., & Kitendaugh, P. (2006). The MedlinePlus public user interface: Studies of design challenges and opportunities. *Journal of the Medical Library Association, 94*(1), 30–40.

Martzoukou, K. (2008). Students' attitudes towards Web search engines: Increasing appreciation of sophisticated search strategies. *International Journal of Libraries and Information Services, 58*(3), 182-201. doi:10.1515/libr.2008.019

Morrison, M., & James, S. (2009). Portuguese immigrant families: The impact of acculturation. *Family Process, 8*, 151-166. doi: 10.1111/j.1545-5300.2009.01273.x

National Center on Accessible Instructional Materials. (2011). What is the National Instructional Materials Accessibility Standard (NIMAS)? Retrieved from http://aim.cast.org/learn/policy/federal/what_is_nimas

Newman, L., Wagner, M., Cameto, R., & Knokey, A.M. (2009) *The post-high school outcomes of youth with disabilities up to 4 years after high school. A report of findings from the National Longitudinal Transition Study -2* (NLTS2) (NCSER 2009-3017). Menlo Park, CA: SRI International. Retrieved from www.nlts2.org/reports/2009-04/nlts2-report-2009-04-complete.pdf

Newman, L., Wagner, M., Knokey, A.-M., Marder, C., Nagle, K., Shaver, D., ….Schwarting, M. (2011). *The Post-High School Outcomes of Young Adults with Disabilities up to 8 Years After High School. A Report from the National Longitudinal Transition Study-2 (NLTS2)* (NCSER 2011-3005). Menlo Park, CA: SRI International. Retrieved from www.nlts2.org/reports/

New York State Office for Technology. (2010). *Accessibility of web-based information and applications*. NYS-P08-005. Retrieved from http://www.cio.ny.gov/policy/NYS-P08-005.pdf

Nielsen, J. (2000). *Designing web usability*. Berkeley, CA: New Riders Publishing.

Oblinger, D.G., & Katz, R.N. (2000). Navigating the sea of ”E”. In R.N. Katz, & D.G. Oblinger (Eds.), *The ”E” is for everything: E-commerce, e-business, and e-learning in the future of higher education. Educause Leadership Strategies* (No.2, pp.1-10). San Francisco: Josey-Bass.

Oakland, T., Black, J.L., Stanford, G., Nussbaum, N.L., & Balise, R.R. (1998). An evaluation of the Dyslexia Training Program: A multisensory method for promoting

reading in students with reading disabilities. *Journal of Learning Disabilities, 31*(2), 140-147. doi:10.1177/002221949803100204

Oakleaf, M., & VanScy, A. (2010). Instructional strategies for digital reference: Methods to facilitate student learning. *Reference & User Services Quarterly, 49*, 380-390.

O'Leary, A.A., Lockwood, P.B., & Taylor, R.V. (1996). Evaluation of detectable warning surfaces for sidewalk curb ramps. *Transportation Research Record*, 1538. doi: 10.3141/1538-06

Owusu-Ansah, E.K. (2003). Information literacy and the academic library: A critical look at a concept and the controversies surrounding it. *The Journal of Academic Librarianship, 29*(4), 219-230. doi:10.1016/S0099-1333(03)00040-5

Parker, D.R., & Banerjee, M. (2007). Leveling the digital playing field: Assessing the learning technology needs of college-bound students with LD and/or ADHD. *Assessment for Effective Intervention, 33*(1), 5-14. doi: 10.1177/15345084070330010201

Pleschberger, S. (2007). Dignity and the challenge of dying in nursing homes: The residents' view. *Age and Ageing, 36*, 197-202. doi: 10.1093/ageing/afl152

Puustinen, M., & Rouet, J. (2009). Learning with new technologies: Help seeking and information searching revisited. *Computers & Education, 53*, 1014-1019. doi:10.1016/j.compedu.2008.07.002

Quarton, B, (2003). Research skills and the new undergraduate. *Journal of Instructional Psychology, 30*(2), 120-124). http://www.projectinnovation.biz/jip_2006.html

Rath, K.A., & Royer, J.M. (2002). The nature and effectiveness of learning disability services for college students. *Educational Psychology Review, 14*, 353-381. doi:10.1023/A:1020694510935

Reaser, A., Prevatt, F., Petscher, Y., & Proctor, B. (2007). The learning and study strategies of college students with ADHD. *Psychology in the Schools, 44*, 627-638. doi:10.1002/pits.20252

Rehabilitation Act of 1973, Section 508. 29 U.S. C. § 794d

Rehabilitation Act of 1973 as amended, 1998, Section 504. 29 U.S. C. § 794(a)

Reid, D.K., & Valle, J.W. (2004). The discursive practice of learning disability: Implications for instruction and parent-school relations. *Journal of Learning Disabilities, 37*, 466-481. doi:10.1177/00222194040370060101

Roberts, K.D., Park, H.J., Brown, S., & Cook, B. (2011). Universal design for instruction in postsecondary education: A systematic review of empirically based articles. *Journal of Postsecondary Education and Disability, 24*(1), 5-15. http://www.ahead.org/publications/jped

Robinson, B.C. (1996). Centering and the passage to adulthood.. In B.G. Glaser, (Ed.) *Gerund Grounded Theory: The Basic Social Process Dissertation.* Mill Valley, CA: Sociology Press.

Rodis, P., Garrod, A., & Boscardin, M.L. (2001). Introduction. In P. Rodis, A. Garrod, & M.L. Boscardin (Eds.). *Learning disabilities and life stories.* Boston: Allyn and Bacon.

Ruban, L., McCoach, D., McGuire, J., & Reis, S. (2003). The differential impact of academic self-regulatory methods on academic achievement among university students with and without learning disabilities. *Journal of Learning Disabilities, 36*, 270-287. doi:10.1177/002221940303600306

Rubin, J. (1994). *Handbook of usability testing: How to plan, design, and conduct effective tests.* New York: John Wiley and Sons.

Schmetzke, A. (2001). Web accessibility at university libraries and library schools. *Library High Tech, 19* (1), 35. doi:10.1108/07378830110384584

Schriner, K., & Scotch, R.K. (2001). Disability and institutional change: A human variation perspective on overcoming oppression. *Journal of Disability Policy Studies, 12*, 100-106.

Seale, J.K. (2006). *E-learning and disability in higher education: Accessibility research and practice.* New York: Routledge.

Shakespeare, T. (2006). The social model of disability. In L.J. Davis (Ed.), *The disability studies reader*,(2nd ed., pp. 197-204). New York: Routledge.

Shaw, S.F., & Dukes, L.L. (2005). Performance indicators for postsecondary disability services. *Journal of Developmental Education, 29*, 10-12, 14, 16, 18-19.

Siebers, T. (2001). Disability in theory: From social constructionism to the new realism of the body. *American Literary History, 13*, 737-754.

Simonson, M., Smaldino, S., Albright, M., & Zvacek, S. (2006). *Teaching and learning at a distance.* Upper Saddle River, NJ: Pearson Prentice Hall.

Sleeter, C. (1986). Learning disabilities: The social construction of a special education category. *Exceptional Children, 53*, 46-54.

Stevens, C.R., & Campbell, P.J. (2008). Collaborating with librarians to develop lower division political science students' information literacy competencies. *Journal of Political Science Education, 4*(2), 225-252. doi:10.1080/15512160801998114

Strauss, A., & Corbin, J. (1990). *Basics of qualitative research: Grounded theory procedures and techniques.* Newbury Park, CA: Sage.

Strubing, J. (2007). Research as pragmatic problem solving: The pragmatist roots of empirically-grounded theorizing. In A. Bryant, & K. Charmaz (Eds.), *The SAGE Handbook of Grounded Theory*. Los Angeles: SAGE Publications.

Su, Shiao-Feng, & Kuo, J. (2010). Design and development of Web-based information literacy tutorials. *Journal of Academic Librarianship, 36*, 320-328. doi:10.1016/j.acalib.2010.05.006

Theofanos, M.F., & Redish, J. (2003). Guidelines for accessible and usable web sites: Observing users who work with screen readers. Retrieved from http://redish.net/content/papers/interactions.html

Titchkosky, T. (2007). *Reading and writing disability differently: The textured life of embodiment.* Toronto: University of Toronto Press.

Trainin, G., & Swanson, H.L. (2005). Cognition, metacognition, and achievement of college students with learning disabilities. *Learning Disability Quarterly, 28*, 261-272. doi:10.2307/4126965

Travers, M. (2001). *Qualitative research through case studies*. Thousand Oaks, CA: Sage.

U.S. Department of Education. (2004). *Building the legacy: IDEA 2004*. Retrieved from http://idea.ed.gov/explore/view/p/,root,dynamic,TopicalBrief,23

U.S. Department of Education, National Center for Education Statistics. (1999). *Students with Disabilities in Postsecondary Education: A Profile of Preparation, Participation, and Outcomes,* (NCES 1999-187). Retrieved from http://nces.ed.gov/pubsearch/pubsinfo.asp?pubid=1999187

U.S. Department of Education, National Center for Education Statistics. (2008). *The Condition of Education 2008* (NCES 2008-031). Retrieved from http://nces.ed.gov/fastfacts/display.asp?id=51

U.S. Department of Health and Human Services. (2006). *Research-based web design & usability guidelines.* Washington D.C.: U.S. Government Printing Office.

Van Den Haak, M.J., DeJong, M.D.T., & Schellens, P.J. (2003). Retrospective vs. concurrent think-aloud protocols: Testing the usability of an online library catalogue. *Behavior & Information Technology, 22,* 339-351. doi: 10.1080/0044929031000

Verhey, M.P. (1999). Information literacy in an undergraduate nursing curriculum: Development, implementation, and evaluation. *Journal of Nursing Education, 38*(6), 252-259. http://www.slackjournals.com/jne

Vogel, S.A., Leyser, Y., Wyland, S., & Brulle, A. (2000). Students with learning disabilities in higher education: Faculty attitude and practices. *Learning Disabilities Research and Practice, 13*(3), 173-186. doi:10.1207/sldrp1403_5

Wallhaus, R.A. (2000). E-learning: From institutions to providers, from students to learners.In R.N. Katz, & D.G. Oblinger (Eds.), *The "E" is for everything: E-commerce, E-business, and E-learning in the future of higher education. Educause leadership strategies* (No. 2, pp.21-52). San Francisco: Josey-Bass.

Walton, M., & Archer, A. (2004). The Web and information literacy: Scaffolding the use of web sources in a project-based curriculum. *British Journal of Educational Technology, 35*(2), 173-186. doi:10.1111/j.0007-1013.2004.00379.x

WebAIM. (n.d.). *Cognitive disabilities part I: We still know too little, and we do even less.* Retrieved from www.webaim.org/articles/cognitive/cognitive_too_little/

WebAIM. (2012). *WAVE web accessibility evaluation tool*. Retrieved from http://wave.webaim.org/

Wolfe, G.L., & Lee, C. (2007). Promising practices for providing alternative media to postsecondary students with print disabilities. *Learning Disabilities Research & Practice, 22*(4), 256-263. doi:10.1111/j.1540-5826.2007.00254.x

World Health Organization. (2001). *International classification of functioning, disability and health.* Retrieved from http://www.who.int/classifications/icf/en/

World Wide Web Consortium. (1997, April 7). *World Wide Web Consortium (W3C) launches international Web Accessibility Initiative* (press release). Retrieved from http://www.w3.org/Press/WAI-Launch.html

World Wide Web Consortium Web Accessibility Initiative. (1999). *Web Content Accessibility Guidelines 1.0*. Retrieved from http://www.w3.org/TR/WCAG10/

World Wide Web Consortium Web Accessibility Initiative. (2005). *Introduction to web accessibility*. Retrieved from http://www.w3.org/WAI/intro/accessibility

World Wide Web Consortium Web Accessibility Initiative. (2008). *Web Content Accessibility Guidelines 2.0*. Retrieved from http://www.w3.org/TR/WCAG/

Yin, R.K. (2003). *Case study research: Design and methods* (3rd ed.). *Applied social research methods series* (Vol. 5). Thousand Oaks, CA: Sage.

Yu, H. (2002). Web accessibility and the law: Recommendations for implementation. *Library Hi Tech*, *20*, 406-419. doi:10.1108/07378830210452613

Xie, I. (2009). Dimensions of tasks: Influences on information-seeking and retrieving process. *Journal of Documentation*, *65*, 339-366. doi:10.1108/00220410910952384

Zaretskii, V.K. (2009). The zone of proximal development: What Vygotsky did not have time to write. *Journal of Russian and East European Psychology*, *47*(6), 70-93. doi:10.2753/RPO1061-0405470604

Zwart, L.M., & Kallemeyn, L.M. (2001). Peer-based coaching for college students with ADHD and learning disabilities. *Journal of Postsecondary Education and Disability*, *15*, 1-15.

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